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THE SURGERY OF THE GALL-BLADDER AND BILIARY TRACT

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IN the review of the literature here presented, every article of value which has been published within the last four years has been carefully read and abstracted. Many papers contained nothing new or of special interest, being merely quotations from other articles, with perhaps a case or two which had come under observation. These have not been included in the review. Also many of the foreign journals, particularly the German and Austrian, are not at the present time available and articles in them have of necessity been omitted. However, practically the entire field has been covered in its different aspects, and all the newer ideas, both theoretical and practical, have been included.

In order to maintain some semblance of system and to consider the different phases of the subject in a more or less logical sequence the following classification has been adopted: (1) Anatomy and Physiology; (2) Etiology; (3) Pathology and Bacteriology; (4) Symptomatology; (5) Diagnosis; (6) Prognosis; (7) Treatment. This form has not been followed strictly, because in considering any one phase it is necessary to associate it with others; but in the main this scheme has been carried out. Many individual cases have been abstracted in detail since this seemed the best plan for emphasizing certain important points.

ANATOMY AND PHYSIOLOGY

It is always well occasionally to review the salient facts in the anatomy and physiology of any organ with which we have to do surgically. For this reason the essentials of these pertaining to the gall-bladder will be taken up.

The normal gall-bladder is pear-shaped, 3 to 4 inches long, projected downward, forward and to the right, to the anterior margin of the liver. It consists of a fundus, body, and neck, is fastened to the liver by connective tissue, and lies in the fossa vesicalis. The fundus extends beyond the anterior margin of the liver in the region of the incisura vesicalis. The position of the fundus is usually at the lower edge of the ninth costal cartilage, on the outer border of the right rectus muscle. The fundus rests on the transverse colon and farther back on the upper end of the descending duodenum or pylorus. The neck usually extends into the posterior and upper part of the vesicle fossa close to the transverse fissure. The body below forms a small pouch, which covers the common duct. The neck continues in a spiral curve into the cystic duct. On the inner surface of the neck is a screw-like valve, which extends through the cystic duct (valvula Heisteri) (63). The capacity of the gall-bladder is from 1 to 1½ ounces. The cystic duct is from 1 to 3 inches long and 2 to 3 mm. in diameter. Its course is toward the left. It usually joins the hepatic duct at an acute angle to form the common duct. The ductus choledochus is the common excretory duct of both liver and gall-bladder and conveys the bile to the duodenum. It is 3 inches long and ¼ of an inch in diameter. The pancreatic and common ducts open into a small pouch in the wall of the duodenum, the diverticulum of Vater, which is 6 to 7 mm. in diameter and opens into the duodenum on the papilla of Vater, situated from 2 to 4 inches below the pylorus on the posterior internal wall near

the junction of the middle and lower thirds. The common hepatic duct is formed by the union of the right and left bile-ducts from the liver. They unite at an obtuse angle, at the right end of the transverse fissure, usually where they emerge from the liver. The average length of the hepatic duct is 1 to 2 inches and its diameter 4 mm. In 1887 Oddi discovered a sphincter composed of plain muscle fiber at the duodenal end of the common duct. This sphincter prevents the continuous flow of bile into the duodenum and keeps up a certain pressure in the gall-bladder and biliary tracts.

Judd and Mann (84) made experiments on cats, dogs, and goats, removing the gall-bladder and noting the effect on the ducts. They found that the pressure in the common duct was greatly reduced a few months after cholecystectomy and that in all cases, especially in cats and dogs, the extrahepatic ducts were greatly dilated. They accounted for this on the supposition that immediately after cholecystectomy the sphincter of Oddi remained normally contracted, attempting to maintain an even flow of bile into the intestine and that therefore in the absence of the gall-bladder which, according to C. H. Mayo and Deaver, acts as a tension bulb during fluctuations of pressure, the ducts of necessity dilate. Later the sphincter becomes paralyzed from tension within, so that the common duct pressure is greatly reduced, the ducts remaining dilated. The pancreatic duct in no case was enlarged. Their final experimental observations were that after cholecystectomy the common duct pressure was much lower than normal, the dilatation of the ducts remaining. In order to determine definitely whether or not the sphincter was responsible for the dilatation, they experimented in three ways: (a) by comparing the pressure withstood in normal and control animals; (b) by dissecting the duct free from muscle fibers in the duodenal wall at the time of cholecystectomy; (c) by sectioning the sphincter through a duodenal incision. These experiments all demonstrated that the sphincter of Oddi was responsible for the dilatation after cholecystectomy. In a few cases the stump of the cystic duct dilated also, and that it did not do so oftener was explained by the fact it was ligated close to the common duct. The liver and pancreas in all these cases remained normal. The practical application of these experiments is that cholecystectomy will probably cure pancreatitis by reducing the common duct pressure and lessening the possibility of bile entering the pancreatic ducts. Mann's comparative study of animals having a gall-bladder with those not having one is interesting, the former having practically no pressure within the common duct in spite of the fact that the sphincter of Oddi is anatomically the same. The normal pressure in the common duct is from 100 to 200 mm. of water.

Eisendrath and Dunlavy (42) quote Oddi, de Woogt and others, as observing dilatation of the cystic duct after cholecystectomy on animals. In their own experiments, where the cystic duct was not removed, it had in the course of from six weeks to two months dilated to form a new bladder. Haberer found in his experiments that if the cystic duct was left behind, the animals developed a newly functioning gall-bladder. Hacker reported such a case in which gall-stone formation had taken place. Contrary to the above observations, J. B. Deaver (35) says that in more than 1,800 operations on the bile passages he has not met with a single case of dilatation of the stump of the cystic or of the common duct after cholecystectomy, and therefore believes it does not exist. Wohl (167) reports an autopsy four weeks after cholecystectomy in which the common duct was twice its normal size.

The muscular fibers in the gall-bladder are few and the connective tissue is of the elastic type, according to Ross (139), whereas Meltzer (106) says that the gall-bladder is well supplied with muscle. Be this as it may, the latter author has made observations which demonstrate that the muscle fibers in the wall of the gall-bladder are antagonistic to those in the sphincter of Oddi. Stimulation of the peripheral ends of the splanchnic nerves causes at the same time a contraction of the gall-bladder and an inhibition of Oddi's sphincter. Stimulation of the vagus causes exactly the opposite effects. The gall-bladder in health may expand several times its capacity without consciousness on the part of the patient, but if cholecystitis or adhesions are present, the patient at once becomes conscious of even slight distention.

As regards the normal arrangement of the cystic and common duct, according to Seelig (146) and Werelius (162) the cystic duct normally enters the hepatic at an acute angle, forming the triangle of Callot (Ruge). This triangle is bounded by the cystic duct on the right side, the hepatic duct on the left, and the cystic artery above, the latter forming the base. This triangle exists in about 33⅓ per cent of the cases. In 25 per cent the cystic runs parallel to and in contact with the hepatic duct and is firmly bound to it. In one-third of the cases the cystic duct is adherent to the hepatic and winds around it toward

the right before opening into it. In those cases in which the cystic runs parallel with or winds around the hepatic duct it would be difficult to tell by palpation in which a stone was located; also a stone in the cystic duct might in this location cause pressure on the hepatic, thus producing the symptoms of obstruction of the common duct. W. J. Mayo (102) says that the juncture between the cystic and hepatic ducts does not occur at any fixed point or in any definite manner, but varies in different individuals. The juncture usually occurs about three-fourths of an inch from the intrahepatic portion of the hepatic duct. The cystic artery usually passes behind and not along the cystic duct. As regards the hepatic duct, in 20 per cent of the cases there are three instead of two, and in 4.5 per cent there are five hepatic duct branches.

The relations of the duct, hepatic artery and portal vein within the gastrohepatic omentum should always be borne in mind. The union between the cystic and hepatic duct takes place within this peritoneal fold. Lower down the common duct is in the edge of the gastrohepatic ligament, with the hepatic artery 2 mm. to the left and the portal vein behind the two. There are always three and sometimes as many as six lymphatic glands along the common, hepatic, and cystic ducts and this should be remembered when palpating for stones or attempting to determine the presence of cholecystitis.

Harrigan (70) adopts the following classification of Testut in dividing the common duct: (a) the supraduodenal, 3 cm. long; (b) the retroduodenal, 20 to 25 mm. long; (c) the pancreatic, 20 to 25 mm. long; (d) the intraparietal portion. The entire common duct averages 6.5 to 8 cm. in length. In 75 per cent of the cases the pancreatic portion is completely enclosed in pancreatic tissue. C. H. Mayo (98) says that in 62 per cent of persons the common duct passes through the head of the pancreas, while in 38 per cent the duct does not enter the pancreas at all.

Schachner (143) writing on anomalies says there have been reported 5 cases of double gall-bladder, each with its own cystic duct, 1 of bilobed gall-bladder, and 1 of diverticulum communicating with the cavity. These latter may be congenital or inflammatory. One case of congenital hour-glass gall-bladder has been recorded and 16 cases of intrahepatic gall-bladder, mostly in infants. There are 13 cases in which the gall-bladder has been found to the left of the falciform ligament, 11 of transposition of the viscera, and 8 cases of floating gall-bladder, each of which had a distinct mesentery and a wide range of mobility. C. H. Mayo (98) has found in the literature 20 cases of congenital absence of the gall-bladder. It is normally absent in the horse, elephant, rhinoceros, deer, and mouse. (99) In these animals the duct is composed of connective and elastic muscular tissue and functionates like a gall-bladder.

A few words in regard to the pancreatic ducts may not be out of place, because pancreatitis is so intimately associated with cholecystitis. Erdmann and Heyd (47) say that in 83 per cent of the cases, the duct of Wirsung carries the entire pancreatic secretion, in 12 per cent the duct of Santorini is the main duct, while in 54 per cent the duct of Santorini may act as a substitute for the duct of Wirsung. This is of importance because in certain cases the passage of pancreatic secretion may take place into the duodenum with almost complete biliary stasis.

This brings one to a consideration of the functions of the gall-bladder, which are by no means definitely established up to the present time. Of course the idea that the gall-bladder acts as a reservoir for bile is long since *passé*. C. H. Mayo and Deaver think that it acts as a tension bulb to take increased pressure away from the liver, thus preventing damage from back pressure. It also tends to keep up a continuous flow of bile into the duodenum by its contractions, which occur from 8 to 10 times a minute. This pumping action is probably of great importance in digestion. Werelius (163) has shown by experiments on dogs that respiration plays a very important part in forcing the bile into the duodenum both from the gall-bladder and hepatic duct. During inspiration he found there was a marked increased pressure in the gall-bladder with undoubtedly a much lower pressure in the common duct at the same time. Thus the bile is forced from the gall-bladder into the ducts and on into the duodenum. During expiration the intracystic pressure is greatly reduced and the pressure in the common duct increased. Consequently the bile flows into the gall-bladder. In both instances the flow of bile is away from the hepatic ducts and toward the duodenum. C. H. Mayo (100) says that bile on its way from the gall-bladder to the duodenum does not re-enter the hepatic duct, as the latter becomes closed from the mechanical pressure caused by the acute angle at which the cystic enters the common duct. Bile which has once passed through the common duct and entered the duodenum cannot again enter the duct because of the peculiar arrangement of the duct

within the wall of the duodenum. Coffey has shown that the greater the pressure within the duodenum, the more the duct entrance is closed, (a) by the flattening of the tube in the wall of the bowel, and (b) by the mucous cuff which guards the ampule of Vater. The hepatic and common ducts are muscle-covered tubes and are functionally able to overcome the sphincter of Oddi and keep the bile moving into the intestine. In other words, they are able to take up the function of the gall-bladder if it is removed.

However, the gall-bladder has other functions than the maintenance of equal pressure. Wohl (167) quotes Schroeder and others as believing that it produces mucus which, mixed with the bile, gives it certain physiological properties. Luciani considers the gall-bladder as a regulator of the flow, not only by the thickened bile which it contains but also through the associated inervation of its musculature and that of the ampule of Vater. Hammarsten showed that the bile of the gall-bladder is eight times richer in solids than that from the liver. In man the bile contains bilirubin, biliverdin, sodium taurocholate, sodium glycocholate, cholesterin, mucus from the gall-bladder, some fatty matter, traces of inorganic salts, sodium and potassium chloride, calcium phosphate and some magnesia and iron. Water forms about 85 per cent. This composition of the bile is of certain interest in the formation of gall-stones and the detection of them by the X-rays (98). About one ounce of bile is delivered and 50 ounces of secretion, including the pancreatic juice, pass through the diverticulum in a day. Now as regards the mucus furnished the bile by the gall-bladder. Shaw (148) says that this mucus is a natural protector of the duodenum and believes that the mucous secretions in the upper intestinal tract are of great importance from the standpoint of protection. It has been shown by Flexner that bile mixed with gall-bladder mucus is much less injurious to the pancreas when injected into its ducts than liver bile not so modified. Mucus is not the only addition to the bile in the gall-bladder. Porter (124) says that bile during its stay in the gall-bladder has added to it sodium glycocholate and taurocholate. He considers this is the most important change which occurs. It is also modified by a diminution of its salts, which makes it less likely to produce acute pancreatitis if it enters the pancreatic ducts.

The secretion of bile is stimulated by the injestion of food and fluids. Judd (81) says that while the secretion of bile is continuous, its output into the duodenum is not constant, but coincides exactly with the period of digestion, in which the chyme is spurted from the stomach into the duodenum. Meltzer (106) states that the discharge of bile is lessened when the amount of chyme from the stomach is restricted and is increased by peptones and albumoses.

According to Leede (89) the absorption of inorganic salts by the gall-bladder makes its bile less destructive to tissues than liver bile. He believes there is a hormone secreted by the gall-bladder into the bile which has a great influence upon the production of HCl in the stomach and thereby of secretin in the duodenum. Meat and the products of protein digestion increase the quantity of HCl and secretin and have the greatest influence on the production of bile. Rost states that animals without a gall-bladder secrete about one-third the amount of bile and pancreatic juice of normal animals.

Ohly found that after loss of function of the gall-bladder, 70 to 80 per cent of the cases showed anacidity and achylia gastrica. He thinks the loss of gall-bladder function disturbs the secretion of HCl. Porter (124) quotes Hohlweg as having found in 39 cases after cholecystectomy 74.3 per cent with diminution or absence of HCl. He decides from his review of the literature and personal observations that while the gall-bladder is an important organ, it is not a vital one.

Lothrop (94) says that bile from the normal gall-bladder in man is usually sterile. It possess very little if any antiseptic quality and is a good culture medium for typhoid and colon bacilli. In suppurative lesions of the gastro-intestinal tract the bile often contains bacteria and after ligation of the common duct in animals it invariably becomes infected. Ross (139) says that bile has no antiseptic properties. As long as it flows freely it has a tendency to wash away any bacteria that may be in the duodenum, but when its flow is obstructed bacteria may pass up the duct. Even bacteria eliminated by the liver are carried through into the intestine when there is no obstruction, but if the latter exists, they may be carried into the gall-bladder and do damage. Bacteriologic studies of 320 cases of cholecystectomy in the clinic of Rovsing showed the gall-bladder and its contents sterile in 54 per cent, 52.7 per cent where a single large stone was present, and 77 per cent where there were multiple small mulberry stones. His observations were that the symptoms of cholecystitis always follow and never precede stone formation, bearing out his conviction that the stones are formed first and infection and cholecystitis come later.

That bile has no deleterious effects on the

stomach and performs its function equally well when passed into this organ as into the duodenum is shown by the experiments of Grey (64) who performed cholecystogastrostomy upon animals. He determined that the bile had no effect upon the acidity of the gastric contents; the dogs remained in good health and three or four weeks after the operation digestion and nutrition were normal. Postmortem examination showed no changes in the gastric mucosa.

During the past few years considerable attention has been paid to the cholesterol content of the blood in cases of cholelithiasis with the object of utilizing it as an aid to diagnosis. Henes (72) says that the presence of a rather definite quantity of cholesterol in the blood under normal conditions has been established. He places it at .0012 to .0018 gm. in 1 ccm. of serum. In various pathological conditions there may be an hypercholesterinæmia. The amount is increased during pregnancy, convalescence from typhoid fever, progressive arteriosclerosis, chronic nephritis, obstructive jaundice, and probably in obesity and diabetes. Fever causes a reduction in the amount of cholesterol in the blood. Reimann and Magoun (130) state that cholesterol increases in the body fat with increasing age, and persons over forty give a higher reading than those younger.

ETIOLOGY

Age and incidence: Lichty and Zurhorst (92) quote Hesse who studied the postmortem records in Petrograd. Among 17,402 necropsies performed in ten years, there were 378 or 0.217 per cent of gall-stone cases. From 19 European and American pathologic reports, including 80,802 autopsies, there were 4,848, or 6 per cent of gall-stone cases. In these statistics the most frequent decade at which the patient came to autopsy was from sixty to seventy years, and of these 4,848 only 16 per cent gave a history referrable to the calculi. W. J. Mayo (101) rightly says that the old idea of gall-stones without symptoms is a myth and every person having stones in the gall-bladder will at some time or other have symptoms produced by them. There can be no question that this is true, if all clinical histories are carefully analyzed. In Lichty and Zurhorst's report there were 614 cases of gall-bladder and duct disease, of which 193 or 31 per cent were operated upon and 421 not operated upon. Of these latter cases the average age of gall-stone patients at onset and time of operation was as follows: for women, onset, 36 years; time of operation, 43 years; for men, onset, 42 years; time of operation, 50 years. The average interval between onset of symptoms and operation was seven years.

Babcock (5) believes that inflammation of the gall-bladder often develops between the first and second decades but escapes recognition until middle age. He reports a case of multiple gall-stones in a girl fourteen years of age with acute pancreatitis, and another in a boy fifteen years old with a gangrenous gall-bladder. C ark (22) in his postmortem observations in the Panama Canal Zone found 21 cases of cholelithiasis under thirty years of age and 20 between thirty and forty years. One case was a male negro baby of four months who died of an acute enterocolitis, in which 2 gall-stones were found. Another was in a negro boy of four years who died of a widespread pneumococcic infection. Deaver (32) in his report for 1914 cites 159 gall-stone cases operated upon, with an average age at time of operation of 44 years. In simple gall-bladder disease it was 45 years, in common duct stone 47 years, and with pancreatic involvement 41 years. He says the decade of greatest frequency in all cases of gall-bladder disease is from 40 to 50 years, though he believes that many cases begin in early life and remain relatively dormant until later. The acute infectious diseases of childhood may be the real cause of the trouble. In his series the average duration of symptoms before operation in all cases was eleven months, in simple and pancreatic cases three years, and in common duct cases 30 per cent were from one to five months' duration.

Peterson (119) in an analysis of 1,066 operations for pelvic disease found gall-stones in 12.66 per cent. As regards age, 29.7 per cent were between sixty-one and seventy years. They were much more common after forty years than before. He believes that age and not the associated disease is the determining factor in gall-stone formation. Buchanan (15) reports among his 300 operated cases a girl of five years with empyema of the gall-bladder and another of nineteen years with gall-stones and acute appendicitis. Hubbard and Kimpton (77) in a study of 400 cases of diagnosed cholelithiasis during six years in the Boston City Hospital found stones in 226 that were operated upon; of these 54 were males and 172 females. Hesse in a postmortem study of a large number of cases cited by Lichty and Zurhorst found the proportion of males to females was as one to seven. In their own tabulation, collected from the practice of 24 different surgeons, where 31 per cent of 614 cases of gall-bladder and duct disease were

operated upon, 251 were males and 363 females. Of the gall-stone cases 163 were males and 283 females. In Clark's Panama Canal Zone report there were 52 males and 22 females, this disproportion being accounted for by the fact that the majority of the patients were males. In Deaver's report of 159 cases, 85.1 per cent of the simple gall-stone cases operated upon and from 60 to 70 per cent of the complicated cases were females. The largest number of males occurred where there was pancreatic involvement.

De Langen (36) presents some interesting statistics in regard to the rarity of gall-stone disease among the natives of Java. In his surgical clinic he found but 1 case among 15,000 patients and this was not a native of the East Indies, while there was not a single instance among the 40,000 out-patients. At the hospital at Sourabaja there were only 7 cases among 67,500 patients and at Semarang there were 8 cases among 47,000. In 1914 throughout the whole of Java there were only 3 cases of gall-stones among 58,021 patients. The cholesterol content of the blood of the natives is very low.

In regard to the preponderance of cholecystitis with or without stones in females, various reasons are given by different observers. Deaver (32) gives the following reasons: (a) sedentary habits, (b) ptosis of the abdominal organs, especially the liver, causing kinking of the ducts, and (c) pelvic infections. He noted the common duct cases were more common after the menopause. Peterson (119) states that the influence of pregnancy on the production of cholecystitis is accounted for by the pressure of the enlarged uterus on the liver and bile passages, causing stagnation. According to Rovsing (141) pregnancy favors a concentration of the bile, which he believes is one of the most important elements in the production of gall-stones. Mayo (98) quotes Payr as having demonstrated that the bile of pregnant women contains an increased amount of cholesterol and that infection during this period is important in accounting for the fact that 4 out of 5 cases of gall-stones occur in women. Tilton (154) also says that the bile in pregnant women contains four times as much cholesterin as in other persons. This fact, with lack of exercise and constipation among females, throws the vast majority of cases among women who have had children.

Typhoid fever. The importance of typhoid fever in the etiology of cholecystitis is unquestioned by all observers, but it is still not certain whether the bacilli enter the gall-bladder with the bile excreted through the liver cells or attack it from behind through the systemic circulation. According to the theory of Rosenow (137) the latter would seem to be the correct interpretation and the bacilli, which are always present in the blood in typhoid fever, cause infarcts in the gall-bladder wall and enter the cavity of the bladder. This theory seems to be supported by the analogy in other locations, where the mucous membranes serve as protectors against surface infection. However, this is not always the case, as for example, gonorrhœal conjunctivitis, gonorrhœal urethritis, diphtheria and many other infections of the mucous surfaces.

In Lichty and Zurhorst's (92) report of 122 cases of gall-stone disease, only 21 gave a history of typhoid; and of 54 cases of cholecystitis, 20 had had typhoid. Hubbard (76) quoting Osler says that one necessary factor for the formation of gall-stones is a low grade inflammation of the biliary tract due usually to the typhoid or colon bacillus, and a second requisite is some obstruction to the outflow of bile from the gall-bladder.

Wohl (167) believes that the bacteria playing the most important rôle in gall-bladder disease are the typhoid, paratyphoid, colon bacilli and streptococci. He quotes Adami as believing that bacteria enter the gall-bladder through the portal circulation by way of the bile. Lothrop (94) says that although typhoid bacilli are present in the bile in typhoid fever, they seldom cause cholecystitis. He thinks the modes of entrance of the typhoid bacilli to the gall-bladder are as follows: (a) through the systemic circulation, passing through the mucous membrane of the gall-bladder into the bile; (b) excretion into the bile directly by the liver cells from the portal circulation; and (c) possibly an ascending infection along the ducts from the duodenum into the gall-bladder. Typhoid bacilli may remain in the gall-bladder months or years after an attack; in one instance, twenty-six years is recorded. He cites 2,864 cases of typhoid fever, only 18 of which developed cholecystitis. In a series of 2,000 autopsies, after typhoid fever at Munich there were only 5 cases of cholecystitis. Babcock (5) says that typhoid bacilli may remain in the gall-bladder for thirty or forty years, as shown by the fact that they have been found in the centers of gall-stones and in the depths of the mucosa in cases where the bile is sterile. In typhoid fever, cholecystitis usually comes on in the third week, any bile stasis during the course of the disease favoring the growth of the bacteria. He cites a series of 200 cases of acute typhoid cholecystitis, in which gall-stones were present in 20 per cent. Rhodes (131) reports 133 cases of cholecystos-

tomy; 59 per cent of the cases among men gave a history of typhoid fever and 24 per cent in women. Price (126) quotes Thomas who examined the records of 895 cases of typhoid fever. Cholecystitis was a complication in only 12. He says this complication may occur at any time during the course of the disease but is most common between the tenth and thirtieth days.

Paratyphoid. Morley and Smith (108) in considering the epidemic of jaundice in Gallipoli in 1915, state that ascending infection in the biliary ducts was extremely common at that time in patients inoculated against typhoid fever. A paratyphoid organism may ascend from the intestine to the gall-bladder and produce a cholecystitis, characterized by slight symptoms such as epigastric tenderness, anorexia and headache. Later, however, the virulence of the infection may be increased and cause gangrene of the gall-bladder or the cholecystitis may persist and produce a descending infection of the common duct with jaundice. They think that paratyphoid infections may play a much more important part than typhoid in febrile jaundice. Burch (17) reports a case of acute suppurative cholecystitis in a man of twenty-five, in whom a pure culture of paratyphoid bacillus A was obtained from the pus. The interesting features were: (a) that no stones were present in the gall-bladder; (b) after cholecystostomy for two weeks the patient ran a temperature from 100.2° to 104°; and (c) during this postoperative febrile course, there was no leucocytosis.

Routes of infection. Regarding the probable and possible routes through which infection can be carried into the gall-bladder, the theory of Rosenow (137) is familiar. He claims that streptococci from the throat, nose, and other foci of infection may have an affinity for the gall-bladder, stomach or appendix, causing lesions in these organs. After demonstrating the presence of bacteria of low virulence in cases of cholecystitis and appendicitis, he thinks it reasonable to suppose that abrasions of the skin and mucous membranes may be important as atria of infection. The transmutability of streptococci has been established and different strains undoubtedly have an affinity for joints, the gall-bladder, stomach, and appendix. Bacteria cultivated from the gall-bladder will have a selective action on the gall-bladders of animals in which they are injected. In 68 per cent of 41 animals, Rosenow was able to reproduce this selective action on the gall-bladder, even to the point of gall-stone formation. Strains developed from the gall-bladder and carried through artificial media will often change their selective action and produce gastric ulcers in animals. This, briefly, is his theory which has claimed the attention of the entire medical and surgical world. Undoubtedly it has a great deal of truth, but with equal certainty it is greatly overrated in the etiology of the conditions named. The practice of removing the tonsils, draining and irrigating the sinuses and extracting all teeth that happen to show faint shadows at their roots, which may or may not indicate a slight suppurative process, is undoubtedly wrong and the pendulum is certain to swing the other way, as it always does in the case of medical theories that are not absolutely proven. According to this theory the bacteria are carried through the systemic circulation to the gall-bladder, stomach, appendix, joints, etc., in the walls or lining of which they locate, according to their selective action, producing infected infarcts which in turn infect the cavities and their contents. Infection in this way occurs from behind and the mucous surface is involved last. Rosenow reasons that infection should never enter by way of the mucous membrane because it is a natural protector against infection, just as the skin and mucous membrane of the mouth protect the underlying tissues. This might be true if there were never abrasions, breaks in continuity, glands or crypts which could harbor micro-organisms, but unfortunately one cannot say that these conditions do not exist in the gall-bladder and appendix. Unquestionably there is such a thing as surface infection and it can occur in the gall-bladder or appendix just as well as in the skin or mucous membranes of the mouth, conjunctiva or urethra.

Babcock (5) divides infections of the gall-bladder into four types, according to the mode of invasion: (a) portal infections, where the bacteria enter through the portal circulation, from any inflammatory processes along the alimentary tract; in these cases they are excreted with the bile and pass into the gall-bladder; (b) ascending biliary infections through the ducts; these occur particularly in inflammations and new-growths involving the duodenum; (c) hæmatogenous infections; (d) contiguity infections, where the gall-bladder is involved by infection from adjacent organs.

Clark (22) says that cholelithiasis stands second to gastroduodenal ulcers in order of frequency. Out of 2,100 autopsies there were 72 cases of gall-stones. In all but 12 of these cases there was a history or anatomical evidence of old or recent inflammatory disease of the intestinal tract, peritoneum, or some abdominal organ.

These observations of course favor the theory of portal circulation or ascending duct infection. Deaver (33) states that in his experience with 1,200 biliary passage operations, he is convinced the appendix is the focus of infection of all upper abdominal infective lesions. Nichols' experiments tend to show that infection of the gall-bladder occurs through the bile from the liver, though of course it is impossible to say that the wall of the gall-bladder was not primarily involved. This biliary tract theory is supported by the fact that vaccination in animals favors the production of gall-bladder lesions rather than preventing them, probably by increasing the elimination of organisms in the bile, because in cases of septicæmia some organisms must be excreted in the bile, and yet in these cases cholecystitis is rare.

Lund (95) thinks it undisputable that bacteria may reach the interior of the gall-bladder by the duct route in cases of duodenal ulcer, etc. Judd (81) says there is no doubt that occasionally infection of the bile passages takes place through the portal circulation by way of the liver and hepatic duct. He thinks that rarely the infection may pass up from the duodenum through the common and cystic ducts.

Schilling (1[illegible]) quotes Dieulafoy as saying that the gall-bladder infection may be primary and appendicitis secondary. He cites some cases in which this apparently occurred.

Boas (12) believes that war conditions with their nervous strain, financial and food conditions, etc., are bringing to light many gall-bladder diseases that had been heretofore undiscovered. He does not, however, make it clear why these conditions should light up or cause gall-bladder infection.

Dennis (38) states that 20 per cent of the gall-bladder cases operated upon by him were acute empyema. He says that when a stone becomes impacted in the pelvis of the gall-bladder, hydrops does not develop, but instead an empyema. He explains this by the fact that a stone in the pelvis produces pressure upon the cystic artery interfering with the blood supply and lowering the resistance, whereas stone impacted in the cystic duct produces no pressure on the cystic artery. Robinson (134) points out that gall-stones are much more frequent among the Germans, who live largely on a proteid diet, than among the Japanese whose diet is principally carbohydrate. He also says that cholelithiasis should always be suspected in men over forty who eat and drink freely, and lead sedentary lives, if they complain of upper abdominal trouble.

Horn (75) reports from the literature 9 cases of situs viscerum inversus with gall-stones. He quotes Kehr, Liebold and Neuling as reporting 312 laparotomies for gall-stones in which there was one similar case. Bland-Sutton in 3,000 abdominal sections, covering a period of twenty years, found the condition once. Kehr in ten years' experience with 10,000 autopsies found it twice.

In discussing the etiology of gangrene of the gall-bladder, Ransohoff (127) states that one or more of three underlying conditions are essential: (a) distention; (b) interference with the circulation; and (c) infection. The presence of a large stone in the cystic duct may in itself act in these three ways. Czerny points out that a stone in this duct may not only cause distention by plugging the duct, but by direct pressure on the cystic artery may cause gangrene. Friederich says that in the majority of these cases there is a solitary stone, either in the cystic duct or in the contracted gall-bladder. The pressure of the stone may produce a gangrenous perforation. Aschoff, in apparently healed gall-bladders, has demonstrated streptococci in the deeper layers of the mucosa. Infection in these cases may be lighted up by slight trauma. In some cases of gangrene there is no stone; thus Kocher reports a case of acute gangrene eight days after a ventral hernia operation, and Cörte, in a woman three months pregnant, without stone. In the case reported by the author the patient received a severe blow on the right side of the abdomen two weeks previously. At operation the gall-bladder was gangrenous but no stones were present.

Stasis and concentration of bile. Rovsing (141) believes that concentration of bile is of the greatest importance in the production of gall-stones. This concentration occurs during the course of febrile diseases and pregnancy and from this inspissated bile precipitation occurs, forming the nuclei for gall-stones. This theory is further carried out by Boysen's chemical study of gall-stones found in 200 cadavers. The freshly deposited stones and the nuclei of all the older stones consisted of bile pigment and calcium. Cholesterin may be precipitated on these nuclei. Clark (22) says that in his experience the inspissating influence on the bile of "malaria" and "black water fever" is open to question as an important etiological factor. Wohl (167) considers that stasis of the bile is caused by inflammatory changes in the gall-bladder. The bile salts being destroyed by the infection, the cholesterin precipitates as it cannot be held in solution without the salts. Aoyama (2) performed a series

of experiments on guinea-pigs and rabbits from which he drew these conclusions: If the cystic duct is ligated, concrements similar to pure cholesterin stones are occasionally formed. If cholesterin or its fatty acid esters are injected subcutaneously and the cystic duct ligated, pure cholesterin stones are precipitated from the bile without the action of bacteria. If cholesterin is given by mouth, the same results are produced.

Cholesterol content of the blood. Rehfuss (128) thinks that the most important factor in the formation of gall-stones is an increase in the cholesterol content of the serum. This may occur through cholesterol rich foods or through the suprarenals or corpora lutea. Porter says that the principal reason why women who have borne children are prone to gall-stones is because during pregnancy there is always an increase in the cholesterol in the blood. We have already spoken of the normal content and will have more to say later.

PATHOLOGY

The most complete classification of pathologic conditions found in the gall-bladder is that of Irwin and MacCarty (78): (a) cholecystitis catarrhalis acuta, in which the gall-bladder is normal as to size and color; the only change is that the villi are conjested; (b) cholecystitis catarrhalis chronica, which varies from group *a* in degree only; there are erosions over the apices of the villi, producing the so-called "strawberry gall-bladder"; (c) cholecystitis catarrhalis papilomatosa, in which a villus is enlarged and there are stones; (d) cholecystitis catarrhalis papillomatosa malignum; in this group there is an irregular or perverted hyperplasia; (e) cholecystitis catarrhalis carcinomatosa, characterized by knob-like out-growths and probably but a later stage of group *d;* (f) cholecystitis chronica, in which there is a proliferation of the connective tissue of the villi and submucosa, producing ridges of scar tissue; (g) cholecystitis chronica cystica; in this group a stone is lodged in the cystic duct and the gall-bladder distended; (h) cholecystitis purulenta necrotica, which occurs during any stage of inflammation with obstruction of the cystic duct, plus infection. Pericholecystitis acuta and chronica are sequels to any of the above types and the adhesions formed may be to the omentum, duodenum, stomach and the transverse colon.

Wohl (167) divided gall-bladder diseases into: (a) catarrhal inflammations; (b) cholelithiasis; (c) empyema and gangrene of the gall-bladder; (d) complications, such as duct obstruction and pancreatitis. His subdivisions are practically the same as those of Irwin and MacCarty. He mentions in addition the very thick-walled gall-bladder in which multiple stones are imbedded in the wall. He believes cholelithiasis is an advanced stage of cholecystitis. Sprengle (151) divided gall-bladder pathology as regards the virulence of the infection as follows: (a) destructive cholecystitis when the calculus is immovable and the contents virulent; (b) simple cholecystitis, where the stone is loose and the contents not virulent; this is the type usually associated with gall-stone colic; (c) hydrops, where there is a permanent closure of the cystic duct and the contents not virulent; (d) chronic cholecystitis in which there may be empyema, where the occlusion is imperfect; (e) the results of any of the preceding groups where the condition is quiescent, such as shrinkage, scar formation, etc. Deaver (32) found first in frequency in the gall-bladders which he removed a chronic or interstitial cholecystitis, and next, acute exacerbations of these conditions. Mayo (99) believes that obstruction and stasis are due to bacterial infarcts in the wall of the gall-bladder from the systemic circulation, which render it stiff and unable to expand. In his opinion all gall-stones are secondary to cholecystitis but the infection may clear up, leaving stones behind which may temporarily plug the ducts. He does not believe that infection reaches the gall-bladder through the lymphatics or the common or cystic ducts. Stagnation plays an important part in the production of gall-stones, because in this condition there are within the gall-bladder cholesterin, bile salts and bacteria, the three most important elements in their formation. Cholesterol is always increased in the blood of adults with growing cells, whether they be cancerous or embryonic in character.

Porter (124), quoting Rothschild and Gerster, shows that in most cases not cured by cholecystostomy. the cause of the symptoms is not in the gall-bladder itself but in the bile. He therefore believes the gall-bladder is rarely the cause of the symptoms of which the patient complains.

Buchanan (15) is convinced that the gall-bladder has remarkable powers of recuperation and in the majority of cases will recover its function after cholecystostomy. He thinks that the fate of the drained gall-bladder, if not totally gangrenous, depends upon the perviousness of the cystic duct.

A rare case of hæmatoma within the gall-bladder is reported by Hendon (71). The symptoms were those of acute gall-bladder infection, but when the abdomen was opened the gall-bladder

was thick, distended, and filled with a blood-clot. Nickell (110) quotes Smithies who reviewed 1,000 cases and made the following observations: There were 434 cases of acute and chronic cholecystitis in none of which gall-stones, sand, nor malignancy were present. Out of this number 228 were of the acute catarrhal type; stones were present in 51 per cent and sand in 8 per cent. Bodenstab (13) in a series of 452 cases found stones in 311 and cholecystitis without stones in 144.

According to Babcock (5) a milky or whitish gall-bladder is always diseased. Peri-cholecystitis may lead to adhesions. There may be enlargement of the tributary lymph-nodes, as will be noted in more detail later. Normal bile is of a clear golden yellow color. Turbid purulent bile suggests cholecystitis, whereas colorless mucus always indicates obstruction of the cystic duct. The mucous membrane in cholecystitis may present any change from a strawberry appearance to empyema and gangrene.

Delle Valle (37) cites a case in which there were 5 adult ascarides plugging three of the bile-ducts in an insane patient who came to necropsy. They were also found in the intestine. There were signs and symptoms of biliary stasis but no gall-stones were found.

Clark (22) in his autopsies among laborers in the canal zone records some interesting cases. In a boy of four years the gall-bladder was full of a putty-like mold of inspissated bile, while in another there was a stone in the cystic duct with a pouch-like formation at the lower end of the common duct, resembling a diverticulum of the duodenum. In still another case the cystic duct was occluded and there were 7 large stones in the gall-bladder. This patient had been operated upon within the year for gall-stones and both bladder and duct emptied of stones. He died of tuberculosis. This undoubtedly was a case of true recurrence. In 2 of his cases there was evidence of ulceration of the stones from the gall-bladder into the duodenum. In another case there were multiple abscesses in the left lobe of the liver with a huge calculus in the common duct, several calculi in the cystic, and many stones in the liver substance.

According to Lothrop (94) in typhoid cholecystitis, the pathology may be that of an acute catarrhal inflammation and ranging from this through all the stages to a more or less extensive necrosis and perforation. There may be multiple ulcers of the mucosa. Perforation usually takes place near the cystic duct. Price (126) quotes Thomas, who collected 154 cases of typhoid fever complicated by cholecystitis. Perforation occurred 39 times. He classifies the pathology of typhoid cholecystitis as follows: (a) acute catarrhal type, (b) acute suppurative, with or without stones, (c) gangrenous cholecystitis. The typhoid bacillus may be alone or associated with other organisms.

Else (44) has written an excellent paper on the mucous glands of the gall-bladder. In the newborn no glands are found in the walls but in the adult two types are frequently met with, both usually pathologic. In the first type the glands extend from the surface epithelium into the mucosa; they may be simple or branching tubules. The second is that described by Luschka, which consists of a straight tubule with the lower portion either coiled or branched, and surrounded by a capsule. These glands may penetrate into the subserosa or serosa, and are not present at birth. Three theories have been advanced for their development: (a) the distention theory of Aschoff, e.g., that they are caused by distention of the gall-bladder; (b) the infection theory, that they are developed by the irritation of infection; (c) that they are misplaced rests. To these the author adds a fourth theory, that of the stimulation of a latent power of growth. The strongest argument in favor of the latter is that true glands cannot form from surface epithelium unless such latent power is present. These glands secrete mucus and it is probable that bacteria enter the gall-bladder from the cystic artery through them. They may be the seat of pathologic processes, either within or around them, or when they contain stones, they may perforate into the peritoneal cavity. They may also be the site of cysts or adenomata. The most important pathologic rôle played by these glands is that they may harbor infection and keep up a cholecystitis. In chronic infection of the glands, cholecystostomy will not produce a cure and this, according to the author, is an argument in favor of cholecystectomy.

It is a well known fact that in cholecystitis the lymphatic glands draining the gall-bladder may become enlarged and thus constitute an important diagnostic factor of the condition. These enlarged glands lie along the common, hepatic and cystic ducts (97); in acute processes they are enlarged and soft and in chronic ones are more indurated. One should familiarize himself with these enlarged glands that they be not mistaken for stones, and that they may be used as diagnostic factors at time of operation. In some cases the enlargement may be so great as to produce jaundice, or lymphœdema of the head of the pancreas (98). The proper method of

palpating these glands is to place the forefinger through the foramen of Winslow and follow the hepatic, common and cystic ducts from above downward in the edge of the gastrohepatic omentum. Cullen (31) reports a case in which there were symptoms of appendicitis associated with icterus. Operation revealed a calcified lymph-gland at the junction of the cystic and hepatic ducts. Fowler (51) records a case in which calcified glands near the common duct produced symptoms of stone within it. It was the first of the kind he had observed in several thousand laparotomies. At operation there was a cysticoduodenal ligament extending from the duodenum to the gall-bladder and a hard mass was felt in the lower portion of the common duct. This with another smaller gland was removed. Moderate cholecystitis was present. The patient recovered and remained well without the removal of the gall-bladder.

Papilloma of the gall-bladder. C. H. Mayo (98) states that in 2,940 cholecystectomies performed in their clinic, papillomata were found 130 times. They are more frequent in females, probably because more gall-bladders are removed in women. There was always a swelling of the lymphatic glands along the bile-ducts, showing that papillomata are due to infection. Out of 2,168 gall-bladders removed at the Mayo Clinic, Irwin and MacCarty (78) found one or more papillomata in 85 of the cases. In all of them the mucosa was intact and the papillomata were usually pedunculated and yellow or white in color. C. H. Mayo thinks that papillomata of the gall-bladder occur as the result of bacterial invasion of the wall, which produces a hyperplasia and possibly later necrosis. The tumors varied in length from two to six times that of the normal villus.

Graham (61), in a study of 30 cases of biliary tract disease, found at operation an enlargement of the liver in 87 per cent. Small pieces of liver tissue were removed and studied microscopically and bacteriologically. His conclusions were as follows: (a) In cases of cholecystitis there were microscopic evidences of inflammation; (b) it was characterized by leucocytic infiltration of the interlobular sheaths; (c) cultures showed the same organisms present in liver and bile; (d) in chronic cholecystitis the changes are those of cirrhosis; (e) the pathology was pericholangeitis; (f) the gross enlargement was usually due to œdema; (g) under proper surgical treatment the liver usually became normal.

In regard to strictures of the gall-bladder, Else (43) from his study of 1,100 removed post-mortem, divides them into two primary types, congenital and acquired. The congenital constituted 11.29 per cent in 62 consecutive post-mortem examinations of babies. They were of three types: annular strictures, those due to folds of the inner layers, and the elbow deformity, in which the fundus is bent on the body. The acquired form arises from any one of seven causes: (a) destructive lesions of the mucosa, (b) intramural infections, (c) lesions beginning in the serosa, (d) adhesions, (e) perforating wounds, (f) chronic indurative processes, (g) malignant tumors.

Pathology of gall-stone formation. Rosenbloom (136) classifies gall-stones according to their chemical composition: (a) pure cholesterol stones, (b) stratified cholesterol calcium stones, (c) cholesterol pigment calcium stones, (d) composite stones, composed of cholesterol and a mantle of cholesterol and calcium, (e) bilirubin calcium stones, usually found in the bile passages of the liver, (f) very rare calcium carbonate stones. He says the theory of Naunyn that the chief source of cholesterol is from the degenerated and desquamated epithelial cells of the gall-bladder and tracts is not accepted by Aschoff and the French observers, who believe that the first step in the formation of cholesterol stones is non-inflammatory. They think it is due rather to increased excretion of cholesterol by the liver or excess of cholesterol in the blood, or possibly because of the resorption of solvent substances from stagnating bile. These primary cholesterol stones may then produce inflammation and occlusion leading to the formation of common mixed stones. From the cases reported by Rosenbloom he concludes that in all where there is a previous history of infection the gall-stones are composed chemically of calcium salts, while in those without a history of infection, they are composed of cholesterol.

Hubbard (76) says that in all cases of cholelithiasis there is a low grade inflammation of the gall-bladder which brings about a desquamation of the epithelial cells and albuminous exudation. There is also an increased formation of mucus and cholesterin with a precipitation of biliary salts, thus producing stones. He reports 108 autopsies where gall-stones are found, in 76 of which they were in the gall-bladder only. Ross (139) quotes Runyon as explaining the formation of gall-stones in the following manner: Bacterial infection produces inflammation of the mucous membrane and desquamation of the epithelial cells. These contain undissolved cholesterin and calcium salts, which react and produce an in-

soluble calcium salt of bilirubin. From this salt and the amorphous cholesterin in the cells the calculus originates and grows by deposition and recrystalization. The number of stones may vary from one to several thousand. Van den Berg (157) thinks that the radial cholesterin stone occurs as the result of stagnation alone and not of infection. He believes that its existence predisposes to infection and when this occurs it may result in hydrops, the formation of mixed cholesterin or other stones. If it exists alone it may not produce symptoms. Henes (72) believes that stones are not dependent upon primary infection of the gall-bladder. Bevan (9) says they are a result of a mycotic infection of the mucous membrane of the bile tracts. The colon and typhoid bacilli are the most common causes but in some cases they may be of purely chemical formation. Eisendrath (41) quotes Poor, Beer, and Lewisohn on the importance of intrahepatic cholelithiasis and thinks that in 3 of his common duct cases the calculi were probably formed in the liver.

Bacteriology of the gall-bladder. Deaver (32) reports 159 cases for 1914 and in these stones were found in 70 per cent. Cultures taken from the bile and pus showed the bacillus coli communis most frequently present. Judd (81) quotes him as saying that the contents of the gall-bladder are sterile in 50 per cent of the cases operated upon for stones.

Rosenow (137) obtained cultures by special methods from the contents of the gall-bladder, the nuclei of stones, the wall of the bladder and adjacent lymph-glands in 47 operative cases of cholecystitis. Cultures made from the contents in 29 showed no bacteria in 13. In the remaining 16 the streptococcus was not found in pure culture, but 5 times in association with the colon bacillus. Cultures from the stones in 33 cases showed no bacteria. In 17, streptococci were found in pure culture. Cultures from the wall of the gall-bladder were made in 32 cases and the streptococcus was found in pure culture in 27. Among the cases in which the contents of the gall-bladder were sterile, the streptococcus was isolated from the wall of the gall-bladder in 8 and from the center of the stones in 6. The lymph-glands were cultured in 8 cases and in 4 a pure culture of streptococcus was found.

Nordentoft (112) reports a patient who had recovered from paratyphoid infection. Several weeks after the attack she developed symptoms of cholecystitis and at operation a distended gall-bladder was found full of pus. He quotes Kehr as saying that when the gall-bladder is removed for tyhpoid infection the drainage should be kept up until the bacilli disappeared from the bile. Porter (124) quotes from Rovsing's clinics 320 cholecystectomies, in 54 per cent of which the bile was sterile. Boysen says that with small primary bile pigment calcium stones the gall-bladder is always healthy. Feldman (48) states that in all cases where death occurs during the course of typhoid fever, typhoid bacilli are found in the gall-bladder. On examination of the gall-bladders removed in 28 cases of cholelithiasis the contents were purulent in 16 and in 5 the typhoid bacillus was cultured from the pus.

Cottam (28) reports a case of acute gangrenous cholecystitis in which the bacillus aerogenes capsulatus was present in conjunction with the staphylococcus. He says that complete gangrene of the gall-bladder is very uncommon and that so far as he knows this is the first case where the gas-producing organism has been found in gall-bladder infections. He accounts for its presence by the fact that the bacillus is a normal habitant of the intestinal tract. [Might this not have been an accidental contamination?—Reviewer.]

Nichols (109) gives the results of his experiments on 97 animals in which 40 gall-bladder lesions were observed. His experiments showed that the organ is the most persistant source from which the bacilli can be recovered after injection. Grieg (65) experimented with rabbits, injecting them intravencusly with cholera-like vibrios. The results left no doubt in his mind that the lesions of the gall-bladder, so caused, formed centers around which calculi were deposited.

In 237 cases reported by Hubbard and Kimpton (77), pus was present in the gall-bladder in 28 and among these the organ was both contracted and distended. Following Courvoisier's law a contracted gall-bladder was more common than a distended one in connection with stones in the common duct.

Bilious ascites. Buchanan (16) has reviewed the literature on the few previously reported cases of this rare condition. He says that in some a massive bile effusion has been found in the abdomen at autopsy, where no evident lesion in the gall-bladder or tracts could be discovered. He quotes M. H. Richardson, who reported a case in which the right upper quadrant was flooded with bile, and in which no perforation of the bladder or tracts could be demonstrated. He also quotes Clairmont and von Haberer as recording a case where they evacuated 7 or 8 liters of fluid resembling bile from the abdomen.

In this case no perforation was discovered, but there was a large stone in the common duct. The two authors just quoted ligated the common duct in four dogs, all of which died with intraperitoneal bile effusion but without perforation of the ducts. These experiments would seem to demonstrate the permeability of some part of the bile tract which, being in a pathologic state, permitted the transudation of bile by a "process of filtration." The case reported by Buchanan was in a boy twelve years old who at the age of two and one-half years had typhoid fever. In his eighth year he began having attacks of pain in the right upper quadrant, with vomiting of bile. Ten days before operation he was injured in the abdomen and eight days later he had cramps with nausea, vomiting, and temperature. The trouble was located in the gall-bladder. At operation the peritoneal cavity contained a mixture of bile and sero-pus. The peritoneum of the gastrohepatic omentum was œdematous and green and the wall of the common duct black. The gall-bladder was tense, red, and full of bile, mucus and pus. There was no obstruction in the ducts. The hepatic duct was drained and the patient made an uneventful recovery.

The reaction of the peritoneum to bile depends on whether the latter is infected or not. The author has collected 16 cases of bile peritonitis; in 81 per cent there was some pathological condition of the gall-bladder or ducts. The author gives the following as possible channels of escape of the effusion into the peritoneal cavity: (a) filtration through the walls of the gall-bladder or ducts rendered abnormal by disease or injury; (b) microscopic perforation; improbable in the majority of cases. (c) small perforations hardly visible to the naked eye, as in a case reported by Sick and Frankel; (d) rupture of the wall, subsequently healed; (e) rupture of the intrahepatic bile canals, as in the cases of Nonwerck and Karileon; (f) postperitoneal rupture of common or hepatic duct by trauma or ulceration, followed by subsequent rupture into the peritoneum. He concludes that his case belongs to the last group. He thinks the treatment of the condition should consist of mopping out the peritoneal cavity and drainage of the common duct.

Diseases of the common and hepatic ducts. W. J. Mayo (102) states that injuries to the common and hepatic ducts are usually due to operative accidents and in only a small number of cases are obstructions caused by ulcerations from gallstones. Benign tumors of the stump of the cystic duct may occur after cholecystectomy and cause obstruction to the common duct. Erdmann and Heyd (47) say that in obstructive conditions at the ampule of Vater it is usual to find the gall-bladder distended with bile, or it and the common duct filled with a clear mucoid fluid, due to pressure acholia, or the immediate absorbtion of bile into the blood and lymphatic vessels. The most frequent obstruction is from cancer of the pancreas, ampulla, or duodenum.

Idiopathic cysts of the common duct are rare and have never been diagnosed before operation. Waller (160) reports from the literature 34 such cases, all of which excepting 5 were operated upon. They are always found in young people. In his series there were 14 girls and 5 boys. Only 5 of the 34 recovered. They were treated by making a communication between the cyst and the intestine, or a side-to-side anastomosis between the duct and the duodenum. Fowler (52) quotes Kehr as reporting in 1915 the total number of idiopathic choledochus cysts to be 19. The most marked enlargement was in the middle and upper portion of the common duct, which possibly was accounted for by an angulation of the duct at its entrance into the duodenum. Most of these cases die in childhood from cholangeitis. The author reports a case of a man twenty-two years old, with symptoms of acute cholecystitis and cholangeitis. At operation the common duct was as large as an orange and the common and cystic ducts dilated. Wieland and Quesada (164) report a case of enormous dilatation of the biliary passages, forming a cavity the size of a child's head, due to a constriction in the retropancreatic portion of the common duct. The pancreatic duct was slightly dilated. Before operation a large tumor was palpable in the right hypochondriac region.

Congenital obliteration of the bile-ducts is also an extremely rare condition. Holmes (74) reports the case of a baby fifteen weeks old, in whom there was congenital obliteration of the common duct with part of the gall-bladder. In this case 3 hepatic ducts opened into a small cavity corresponding to the upper part of the common duct. The pancreatic duct opened at the papilla normally. He thinks congenital atresia is due to faulty development from the primary tissues. When the lumen is abnormally small or where traction or pressure tend to obliterate it, the walls may adhere and the patency be lost. After birth infection may occur from the intestine and lead to obliteration. The author is inclined to believe that congenital obliteration is not so rare as generally supposed.

In the experience of Judd (81) and others, dilatation of the common duct has been ob-

served in hydrops of the gall-bladder, where a stone had plugged the cystic duct for a long time. Mitchell and Stifel (107) recorded the experiments of Herring and Simpson on experimental obstruction of the common bile duct in animals. Each individual observation extended over a few hours only and showed after ligation a mean pressure within the duct of 300 mm. of bile. As regards the effects of nerve stimulation, these observers found that when the vagus was stimulated there was a prompt fall in pressure. In their own experiments, observations were made from two to five days after ligation of the common duct. The mean bile pressure in cats was 278 mm. They were unable to obtain any uniform variations in pressure by stimulation of the nerves. The practical point is: "Why do the obstructed bile passages rupture after an interval of several days?" They think it is not because of continued or progressive rise of fluid pressure, but rather on account of the inflammation which may occur even after aseptic operations. The ruptures may occur close to the ligature, proximal to it, or even in the gall-bladder itself. Their experiments show that the pressure is no higher in chronic than in acute obstructions, though in the latter it rises sharply during the first 3 hours after ligation and remains fairly constant thereafter. This constant pressure is the result of two factors, secretion by the hepatic epithelium, and absorption by the hepatic veins.

According to Lund (95) a stone in the cystic duct or an œdematous gall-bladder neck may produce sufficient pressure on the common duct to cause jaundice. Eisendrath and Dunlavy (42) in discussing the fate of the cystic duct after cholecystectomy report the case of a patient who had previously had the gall-bladder removed. They performed a secondary operation for recurrence of symptoms and found a dilatation of the cystic duct with calculus. A similar case was operated upon and reported by Floercken.

A few words more in regard to the cholesterol content. Reimann and Magoun (130), in discussing the cholesterol content of the blood in gall-stone disease, state that a hypercholesterinæmia is found in a number of conditions besides gall-stones. The most important are nephritis, arteriosclerosis, syphilis, and diabetes. The authors made cholesterol determinations on 60 patients operated upon in Deaver's clinic. They adopted 200 mg. per 100 ccm. of blood as the upper limit of normal. Hypercholesterinæmia has been found in obstructive jaundice but there was no relationship between the degree of jaundice and the amount of cholesterol. It has also been observed in malignant tumors. Anæmia produces a low cholesterol content. In 37 women, 16 with stones, the average was 225 mg. of cholesterol, and 21 without stones, 206 mg. In 23 males, 6 with stones averaged 200 mg., and 17 without stones, 203 mg. This subject will again be referred to under diagnosis.

McNeil (105) made a study of the bile obtained from the duodenum by means of the duodenal tube passed into an empty stomach; 4 of the cases were cholecystitis, 3 of them acute. In 2 of the acute cases bile-stained pus cells were found and there were also round or oval deeply bile-stained cells, larger than a leucocyte and containing a round and often eccentric nucleus. These latter were highly refractile. In 1 case staphylococci were found and in another motile bacilli. In 1 of the cases non-bile-stained polymorphonuclear cells were present, and in still another chronic cholecystitis, with occlusion of the cystic duct, the findings were negative.

SYMPTOMATOLOGY

Babcock's (5) classification of the symptomatology of chronic cholecystitis is the most logical met with in the literature and it will be given first place. He divides the condition into three stages as regards symptoms: (a) the stage of cholecystic indigestion and toxæmia, which may continue from fifteen to twenty years. In this stage the operative mortality should be under 1 per cent. (b) The stage characterized by the movement of calculi, with recurrent attacks of acute inflammation. The movements of calculi often follow indiscretions in diet, frequently occur at night and last but a few hours. When no calculi are present the attacks are less violent and may last for several days. The second stage is chiefly observed between thirty-five and fifty years of age. (c) This stage is characterized by acute and dangerous complications such as empyema and gangrene of the gall-bladder, obstruction of the common duct, acute pancreatitis, carcinoma and intestinal obstruction from stone. These complications usually occur between forty-five and seventy-five years of age. Babcock thinks the diagnosis should be made in the first stage, to avoid later trouble, though at this time, while the patient presents a cause of infection, there is little or nothing to be found on physical examination. The symptoms of this important first stage may be grouped as follows: (a) digestive symptoms, such as fullness and distress after eating, bitter eructations, belching, more rarely vomiting, idiocyn-

crasy toward certain foods, and relief by fasting or taking of alkalies. In gall-bladder infections there may be so-called intestinal indigestions, also acute or subacute arthritis, cephalalgia, neuritis and various neroses. Occasionally fever without other symptoms may result from cholecystitis.

Hubbard and Kimpton (77) in a study of 226 cases found that severe pain was nearly always present at some time during the course of gall-stones; such a history was given in 212. Next in importance was vomiting, which was present in 137, and was mild or severe and persistent. Jaundice in varying degree was present at some time in 107. Of the jaundiced cases, in 70 stones were in the gall-bladder only, in 25 they were in the common duct only, or in association with stones in some other part of the bile tract, in 9 they were in the cystic duct alone or in association with calculi in some other part, while in 3 they were not accurately located. Chills occurred 9 times. An "abdominal mass" was present in 49 cases, and was indefinitely located in 6 more.

Robinson (134) says that in people past middle life there are two symptoms which point particularly to gall-stones: (a) nausea and vomiting after a meal of rich fatty food; (b) the occurrence of an attack of diarrhœa during or immediately after a hearty meal. With both of these there is often chilliness and faintness.

C. H. Mayo (98) in discussing cholecystitis without stones points out the important fact that reflex gastric symptoms may be prominent. Even attacks of colic may occur, though they are not so severe as with stones. Tenderness over the gall-bladder in these attacks may last for several days. He also lays stress in these cases upon a "qualitative food dyspepsia," particularly when fats or foods which produce gas are eaten. Gastric stasis may be a marked reflex symptom. The pain may be referred to the left costal arch or the epigastrium. Blocking of the cystic duct with infection causes but little increase in temperature, while infection of the common and hepatic ducts is associated with a high temperature. This is because the fundus contains few lymphatics, while the ducts are rich in them. When obstruction of the common duct persists, there is usually jaundice. Where there is persistent infection in the gall-bladder, constipation is the rule, while in those cases associated with pancreatitis, attacks of diarrhœa are often noted.

Tilton (154) says the symptoms are characteristic when stones are associated with inflammation of the gall-bladder, but when there are no stones or they remain quiescent, this is not so. In these cases they are usually referred to the stomach, according to some authorities in as many as 70 per cent. There is then epigastric distress, loss of appetite, nausea and vomiting, the latter often giving relief. Careful histories and examinations have shown that not more than 25 per cent of the cases operated upon for gall-stones had typical colic at any time. Jaundice is rare when the stones are confined to the gall-bladder and is not always present when stones are in the common duct. Ross (139) says that gall-stone colic is caused by the passage or attempted passage of stones through the ducts, and is more apt to occur when they are small, because the cystic duct has a diameter of only one-eighth of an inch, the hepatic one-sixth of an inch, and the common duct, which gradually narrows from above downward, of five-sixteenths to three-sixteenths of an inch. In his experience stones may remain in the gall-bladder without symptoms unless fresh infection occurs.

Deaver (32) gives as the most consistent symptoms of gall-bladder disease: (a) long continued indigestion and flatulency; (b) recurring attacks of pain in the epigastrium and right upper quadrant. In pancreatic cases the pain is primarily in the epigastrium. He quotes Reidel on the causes of this colic-like pain: (1) adhesions about the gall-bladder without stone, (2) adhesions about the gall-bladder with stones and the cystic duct patent, (3) inflamed distended gall-bladder with occluded cystic duct, (4) inflammation of the common duct, (5) transit of stones through the extrahepatic ducts. The pain is usually referred to the right shoulder and right costal border but occasionally to the left hypochondrium or back, in which case there are usually adhesions to the stomach or duodenum. (c) Tenderness and rigidity in the right hypochondrium; (d) vomiting after meals; (e) jaundice, present in 41 per cent of simple gall-bladder disease, 55 per cent of the common duct cases and 38 per cent where there is pancreatic involvement. Where there is no mechanical obstruction the cause of jaundice is infection, either in the extrahepatic ducts or higher up. Deaver places no reliance upon coagulation time, because the methods in use are too inaccurate; neither does he derive any benefit in diagnosis from an examination of the intestinal contents or test meals.

Andries (1) quotes Moynihan in regard to the inaugural symptoms of gall-stones. They are referred to the stomach and are as follows: a feeling of fullness, weight, distention or oppression in the epigastrium one-half to three-fourths of

an hour after meals, relieved by belching and instantly dismissed by vomiting. The symptoms depend upon the quality and not the quantity of food, "qualitative dyspepsia." In some cases this sense of epigastric tightness may develop into intense pain if not relieved, and the patient may be unable to wear tight clothing during the attacks or may experience a "catch" in the breath. There may be faintness and nausea, and for several days afterward the body may feel stiff. Andries brings out a very important point, which is not often mentioned; during an attack there may be no elevation of temperature but the leucocyte count often ranges from 15,000 to 25,000, showing the presence of a mild infection. Without the leucocyte count it would be impossible to detect the infection. W. J. Mayo (101) says that in simple gall-stone colic the pain is always referred to the epigastrium and when it passes into the region of the gall-bladder it is an indication of change in the wall of that organ. From that time on the patient does not have complete relief between colics.

Graham (60) states that in gall-stone disease the symptoms come on in acute attacks of short duration followed by intermissions of hours, weeks, months, or years, during which the patient enjoys normal health. Quite as characteristic as the suddenness of onset is the abrupt cessation.

C. H. Mayo (100), again commenting on qualitative food dyspepsia in cholecystitis, says that epigastric distress is caused by taking certain foods which develop gas, such as raw apples, oils, and fried foods. The stasis in the duodenum thus produced presses on the duct and if there is cholecystitis, the gall-bladder cannot expand without producing pain. If the cholecystitis subsides and leaves stones the patient may suffer from colic due to plugging of the cystic duct. He says that one-fourth of diseased gall-bladders do not contain stones, but that severe colic is possible from plugs of mucus and thick bile obstructing the duct.

Gil's (58) conclusions in regard to icterus in surgical diseases of the bile passages are: (a) Stones in the gall-bladder or cystic duct do not produce jaundice; (b) colic accompanied or followed by icterus, which completely disappears and does not return with another attack means the passage of a stone; (c) varying degrees of icterus, more intense during colic, usually means common duct stone; (d) persistent icterus, becoming more intense with colic, means retained stone in the common duct; (e) persistent jaundice without a history of colic means compression of the common duct by a tumor in the head of the pancreas.

As regards the gall-bladder his conclusions are as follows: (a) When the cystic duct is obstructed the organ distends, bile is absorbed, the bladder becomes filled with mucus, and there is no jaundice; (b) if there is severe infection the contents become purulent and there is pain and temperature; (c) in partial or complete obstruction of the common duct, if the gall-bladder is healthy and the cystic duct open, the gall-bladder di tends and the liver enlarges. In the majority of cases, however, the gall-bladder, having been the site of chronic inflammation, is smaller than normal; (d) when there are symptoms of common duct obstruction the gall-bladder is contracted in 80 per cent of the cases. Roman (135) bases his observations on 2,000 operations on the liver, gall-bladder, bile passages, and pancreas. He says when the gall-bladder becomes entirely filled with stones, inspissated bile or mucus, the patient may never have biliary colic, because only movable stones produce colic. Sprengle (151) thinks that gall-stone colic is due to sudden or lasting occlusion of the cystic duct with retention of the bladder contents. Bevan (9) believes that the intracystic tension due to mucous membrane swelling and excessive mucus secretion is the cause of pain rather than peristaltic action. Babcock (5) says there are no essential nerves in the gall-bladder except at the neck and therefore pain is present only when pressure or traction is exerted on the ducts or sensitive tissues about.

Bodenstab (13) says that tenderness in the gall-bladder region was the most common symptom present in his cases. The others in their order of frequency were: vomiting, belching of fluid or gas, dyspnœa during attacks, radiating pain, reflex digestive disturbances, and jaundice. Rhodes (131) in 133 patients found a history of jaundice or jaundice at examination in 48.5 per cent.

A symptom not often mentioned but of great interest in the differential diagnosis of gall-bladder lesions is hæmorrhage from the stomach where no gastric, pyloric or duodenal ulcer is present. Turner (156) reports such a case in a woman of twenty-eight, who had been operated upon for gall-stones. The symptoms recurred and she had numerous attacks of gall-stone colic with vomiting of considerable quantities of bright red blood. A second operation was done and 6 small stones removed. She did not vomit blood after the second operation. Todd (155) mentions a case of stone in the common duct, one of the symptoms of which was repeated hæmorrhages from the stomach.

Dennis (38) found in acute empyema of the gall-bladder that colic without jaundice but with temperature and tenderness were the important symptoms. Paus (118) in discussing acute cholecystitis says that pain was a prominent symptom in all of his cases; it was of all degrees, from a sense of oppression to a severe colic. He quotes Rovsing as reporting a case in which the only symptom of cholecystitis was severe pain in the right shoulder. The pain may resemble angina pectoris. One of his patients had pain in the left side and left shoulder with great sensitiveness over the gall-bladder. In his acute cases there was vomiting in 31 per cent and slight jaundice in 43 per cent, but the most characteristic sign was tenderness under the right costal arch.

According to Lothrop (94) the symptoms of cholecystitis during typhoid fever may be masked by the condition of the patient, many mild cases being overlooked. If an attack comes on during the period of convalescence there are the usual symptoms, pain in the gall-bladder, tenderness, nausea and vomiting, and often a distended gall-bladder. In addition there may be chills and sudden rise in temperature and leucocytosis. The symptoms may subside or the process go on to necrosis and perforation, which is indicated by sudden pain, collapse and peritonitis. Price (126) in discussing cholecystitis complicating typhoid says that the most prominent symptoms are acute agonizing pain in the right upper quadrant, with nausea, vomiting, rapid pulse, rise in temperature, and distention of the abdomen. When perforation is imminent or has occurred, the symptoms are those of peritonitis. He thinks that percussion of the abdomen is more valuable in eliciting tenderness over the gall-bladder than is palpation.

Horn (75) reports a case of situs vescerum inversus with gall-stones, in which the patient had pain for nearly forty years in the left hypochondriac region. One year before operation she sustained a jarring injury, after which the pain was worse. She also complained of tenderness beneath the left costal arch. He operated through the left rectus muscle and removed 4 gall-stones. Horn records 9 similar cases from the literature. Paus (118) also reports a case of transposition of the viscera with a tender gall-bladder on the left side.

Eisendrath (41) has written on unusual symptoms of stone in the common or hepatic duct. They may exist in these situations without giving rise to the symptoms which have always been considered pathognomonic. In 8 cases in which he operated the symptoms were: (a) pain similar to gall-stone colic; (b) icterus, slight or occurring only during attacks of pain; in 4 cases there was no icterus at any time; (c) chills and fever. The common duct varied in size from the little finger to the thumb.

As regards the analysis of the gastric contents in cases of gall-stone disease, Lichty and Zurhorst (92) record their findings in 81 operated cases; 73 per cent had hyperchlorhydria. In 36 cases of cholecystitis, 70 per cent had the same condition. Ohly (114) found secondary gastric disturbances in cholelithiasis: hyperacidity in 18 and deficient secretion in 46. In only 13 of 77 cases were the chemical findings in the stomach normal. In acute cholecystitis hyperacidity was the rule. All cases of colic were accompanied by excessive or deficient secretion. In many cases the stomach and intestinal disturbances persisted for years before there was gall-stone colic.

Association with other diseases. Peterson (119) found gall-stones in 135 out of 1,066 laparotomies for pelvic disease. Kelly found them in 14.5 per cent and in the Mayo Clinic they were present in 17.1 per cent of uterine myomata. The reasons for this large percentage of gall-stones in pelvic diseases are: (a) the high average age; (b) the high percentage of patients who have borne children; (c) the proportion of uterine and ovarian neoplasms present. He advocates a routine examination for gall-stones unless there is some contra-indication. When stones are removed, from 85 to 90 per cent of the patients will have no further trouble; otherwise 30 per cent will suffer from further gall-bladder symptoms. His conclusion is to remove the gall-stones at the first operation when it can be done with safety.

Francini (54) reports a case of ptosis of the liver as part of a general enteroptosis complicating gall-stones. In his operation he first anchored the liver and then performed a cholecystostomy. The gall-bladder thus furnished an additional support to hold the liver in place.

Lichty and Zurhorst (92) in their analysis of 614 cases of gall-bladder and duct disease found only 6 patients presenting a complicating glycosuria. In their experience the incidence of glycosuria as compared with other associated diseases was only one-tenth of one per cent higher.

C. H. Mayo (97) says that as a more thorough exploration of the ducts has been practised pancreatitis has been found with increasing frequency. Deaver (32) in his analysis for 1914 found the appendix involved so that it had to be removed in 80 cases out of 159. According to

Judd (81) ulcer of the duodenum and cholecystitis are very commonly associated.

Lichty (91) points out that many functional and organic diseases of the heart are caused by lesions of the appendix and gall-bladder. Paus (118) quotes Bull as having seen 2 cases in which acute appendicitis and cholecystitis were associated. He had a similar case and records 2 others in which there was a simultaneous acute infection in the gall-bladder and right kidney.

Malignant tumors of the gall-bladder. Else (45) says that sarcoma and carcinoma are found in the gall-bladder both as primary and secondary tumors. Primary sarcoma is very rare and the secondary form attacks the gall-bladder by extension. It is not an infrequent site for melanosarcoma. Carcinoma occurs more frequently. In the Breslau statistics it formed 5 per cent of all cases of carcinoma, while in those from Göttingen 6 per cent were in the gall-bladder. The point of origin is most frequently in the fundus. Often the whole gall-bladder is infiltrated and there may be stones. Three types retain the cylindrical form of the cells: adenocarcinoma, papillary and solid cylindrical cell carcinoma. In addition to these types there is a scirrhous form. Metastases do not occur so early nor grow so rapidly as those from other portions of the gastro-intestinal tract, and those from the fundus occur at a later period than from the neck. Liver involvement occurs usually by direct extension. In the Basle statistics the liver was involved in about 40 per cent of the cases, occasionally reached through the portal circulation. The tumor may involve the colon, stomach, duodenum and portal vein, in the former producing obstruction and in the latter ascites. If the common and hepatic ducts are involved there is icterus and the colon may be perforated. Secondary tumors may develop in the peritoneum from detached cells and in the large intestine from the cells passing down with the bile. As regards age, the Basle statistics showed 60 per cent between sixty and seventy years. Proescher reports a case in a man 22 years old. Carcinoma of the gall-bladder is more frequent in women, different statistics placing the frequency from 75 to 90 per cent. Gall-stones are the most important etiological factor, as they are present in from 66 to 100 per cent of the cases. The majority are adenocarcinomata, and the mucous glands from which they originate are of two types: those which do not extend below the mucosa, and Luschka's glands, which may extend to the subserosa. The other source from which adenocarcinoma may develop is adenoma. Aschoff reports finding fundus adenomata in 3 per cent of all the cases. The gall-bladder may be involved secondarily by cancer.

Judd (81) states that malignant disease of the gall-bladder occurs rarely and is always associated with stones. Vincent (159) says that primary cancer of the liver usually originates in the gall-bladder, the hilus of the liver, or the bile-ducts. The growth may be papillary or fungous in character, and the symptoms are similar to those of carcinoma of the liver plus gall-stones. Primary carcinoma of the bile-ducts is more frequent in men than in women and one of the first symptoms is jaundice. Most of the cases occur in the common duct or at the junction of the cystic and hepatic and are anular in type. The jaundice is usually permanent. Pain is dull, aching, but is occasionally colic-like. There is cachexia and rapid loss of strength. Cancer is differentiated from common duct stone by the sudden onset of jaundice in the latter and its subsequent intermittent course. The pain in stone is sudden, severe, sometimes radiating, and there is not the rapid cachexia. Crohn (30) gives the point of origin of cancer of the bile and pancreatic ducts in order of frequency: (a) the common duct, (b) ampule of Vater, (c) the duct of Wirsung, (d) papilla of Vater, (e) head of the pancreas, (f) neighboring organs. He considers the duodenal tube of value in early diagnosis, as it will show the absence of bile in tumors of the ducts. Lund (95) in 347 cases had 3 in which cancer of the gall-bladder developed after removal of the stones.

As regards the treatment of malignant tumors of the gall-bladder, Kehr (86) states that he has seen only 1 recovery in 49 operated cases. In his review of the literature he found 350 operations with permanent cure in 2.3 per cent of the cases, due to the impossibility of early diagnosis. W. J. Mayo (101) states that stones were present in 85 per cent of his cases. In 1911 he said that when carcinoma of the gall-bladder was sufficiently advanced to diagnose the condition at time of operation the patients did not survive a year, but in a number where the gall-bladder was removed and found to be carcinomatous afterward, 5 patients were alive and well from two to six years after operation. Erdmann and Heyd (47) give the following indications for operation in malignancy: (a) mistake in diagnosis; the induration is not always malignant and these cases should be given the benefit of the doubt; (b) relief of pain and distention; (c) severe pruritus; (d) prolongation of life in comparative comfort; (e) hopelessness of cases without operation. A neoplasm at the

ampulla may obstruct the pancreatic flow as well as the biliary. Cancer of the duodenum represents about 0.4 per cent of all the carcinomata, and 70 per cent of this number are carcinomata of the ampulla.

Rupture of the common duct. Lapenta (88) reports a case of perforation of the common duct at its juncture with the cystic due to calculi. The stones were removed and the perforation closed with Czerny Lembert sutures of fine chromic catgut. Recovery was uneventful. The diagnosis of perforation before operation was based on the comatose condition of the patient, tenderness in the right upper quadrant, and no symptoms of gastric or duodenal ulcer.

Perforation of the gall-bladder. Beye (11) reports 2 cases of perforation operated upon by C. J. Rowan, with recovery in both. One was a boy of eleven years, who two months previous sustained an abdominal injury causing pain, fever and vomiting. The day on which perforation occurred he received a second blow in the abdomen, followed by unconsciousness. Operation revealed a large amount of bile-stained fluid in the abdomen. There was peritonitis and a single perforation in a thickened gall-bladder. No stones were found. The abdomen was drained and the patient recovered. The second case was a woman in whom a stone was impacted in the cystic duct. She had an attack of gall-stone colic one and one-half years before operation and another five months later. After the first attack a swelling formed in the right flank, which opened and discharged bile and a few small calculi. At operation the gall-bladder was found to communicate with the fistula. It was removed. Grant (62) reports 2 cases of rupture of the gall-bladder, in one of which there was gangrene of a portion of the wall; the other patient, refusing operation, died of peritonitis due to the perforation. In both cases there were stones.

Complications. In addition to the above, which may be considered as complications, there are other conditions which come more strictly under this heading. Hall (69) reports a case of intestinal obstruction and volvulus due to a large gall-stone. When by ulceration a stone passes into the intestine the patient is always in great danger, even though he may survive. When intestinal obstruction occurs, it may be so many years after the acute attack that the real cause is not recognized until operation or necropsy. Jones (80) quotes Schnitzler of Vienna as having reported in his own experience 13 cases of intestinal obstruction due to gall-stones. Wagner collected 334 cases from the literature, and of these 191 were women and 71 men. The average age was forty years. In 70 per cent the point of obstruction was in the lower ileum, because the small intestine gradually diminishes in size to the ileocæcal valve. Jones records 3 cases of obstruction due to gall-stones. Parks (115) reports the case of a woman operated upon for acute intestinal obstruction due to a gall-stone weighing over an ounce. She gave a history of slight abdominal pain at intervals during the preceding ten years. The stone had evidently ulcerated from the gall-bladder into the intestine. Aspinall (4) reports the case of a woman with symptoms of intestinal obstruction who had attacks of gall-stone colic for nine years. At operation a large gall-stone obstructed the lower ileum. At the site of the stone there was a marked ring of contraction caused by irritation, which with the stone was responsible for the obstruction.

Clark (22) reports 2 postmortem cases, where stones had ulcerated into the duodenum. Tilton (154) gives the following acute and chronic complications of gall-bladder disease. Acute: (a) acute cholecystitis, sometimes with perforation; (b) acute obstruction of the common duct by stone, with cholangeitis and jaundice; (c) acute hæmorrhagic pancreatitis; (d) acute intestinal obstruction. Chronic: (a) carcinoma; (b) chronic or intermittent obstruction of the common duct with cholangeitis; (c) chronic pancreatitis; (d) adhesions between the gall-bladder and adjacent organs causing severe functional disturbances of the stomach and intestine. Investigation of the recorded cases shows that about 95 per cent of the malignant changes in the gall-bladder are due to chronic irritation by stone.

Eisendrath (41) says that infection of the pancreas may occur secondary to that of the gall-bladder through the close relationship of the lymphatics. Pancreatitis of the indurative form results in compression of the common duct. In Deaver's series of 42 recurrences among 1,041 operations, pancreatitis was the cause of the symptoms in about 10 per cent. Judd (81) quotes Archibald as saying that all cases of pancreatitis are due to irritation from bile entering the pancreatic ducts and producing chemical rather than bacterial changes.

Hubbard (76) records 108 autopsies where gall-stones were found. In 76 the stones were in the gall-bladder only and of these 9 died, the causes of death being hepatitis, cancer of the gall-bladder, pancreatitis, and abscess of the liver. In 32, the stones had passed into the ducts and caused death in 43 per cent.

Paus (118) records a case in which a mild cholangeitis was associated with necrosis of the pancreas. He also reports 5 fatal cases due to diabetes, pneumonia, and gangrene of the gall-bladder. Phlebitis and pulmonary complications developed in 10 per cent.

W. J. Mayo (101) reports among 4,000 operations on the biliary passages, complications in more than two-thirds of the cases, stones in the common duct in 492, and serious complications involving the liver, transverse colon and duodenum were the rule.

Pauchet (117) says that three conditions should be kept in mind when operating upon the gall-bladder: simple cholecystitis without stones, pancreatitis, and icterus. Hoerhammer (73) says that in rare cases the gall-bladder may perforate extraperitoneally, either adhering to the anterior abdominal wall, perforating and producing an abcess which ruptures externally, or by adhering to the peritoneum posteriorly it may eventually rupture externally. These may in time cease to communicate with the gall-bladder and the communication be closed before the abscess opens.

Reidel (129) states that subphrenic accumulations from the gall-bladder may occur: (a) from liver abscess, due to purulent cholangeitis; (b) from suppurations around stones in the bile passages; (c) from rupture of the gall-bladder, into the liver and thence into the subphrenic space; (d) by perforation of the gall-bladder into adhesions outside it; (e) from rupture of the gall-bladder, the pus passing to the subphrenic space.

Belaustegui (8) reports the case of a woman who had an hydatid cyst of the liver during pregnancy. She was operated upon and a number of years later developed a biliary fistula with icterus and great emaciation. Secondary operation showed a complete obstruction of the common duct by stone in the ampule of Vater. She recovered completely.

Lewisohn (90) reports a case of intrahepatic cholelithiasis. At operation the gall-bladder contained stones and there were several incapsulated intrahepatic calculi. One of these had become infected and the abscess perforated into the free peritoneal cavity.

C. H. Mayo (98) says chronic infections in the gall-bladder are often the source of headaches and myocardial degenerations. Deaver (32) quotes Babcock as saying that myocarditis is the direct result of upper abdominal infections. Infection sometimes extends from the common to the hepatic duct and into the liver, thus producing enlargement of the latter and marked toxic symptoms. He thinks that operation in these cases is associated with a very high immediate mortality.

Judd (83) calls attention to the fact that long standing jaundice greatly adds to the risk of operation by causing hæmorrhage from the wound or mucous surfaces within eight or ten days after operation. The coagulation time may be from twelve to fifteen minutes. He considers that transfusion of these patients before operation may be of great value, and where the oozing has begun he advises aspiration or incision of the liver substance.

Sadlier (142) discusses excessive drainage complicating the surgery of the common bile-duct in common duct infections with involvement of the pancreas, and in incomplete obstruction from stone. He believes this is largely due to back pressure. In partial obstruction there may occur a dilatation of the smaller bile-ducts of the liver and when this is suddenly removed a venous engorgement of the latter takes place with resulting transudation. This, with the back flow of pancreatic fluid, might account for the excessive drainage.

Recurrence of symptoms. Deaver (34) says that since 1910, 1,189 cases were operated upon; 51 of these had had previous operations on the biliary passages, so that 4.2 per cent of the work represented previous failures to cure. Sixty per cent had recurrence and were operated upon the second time one year after the first operation; 30 per cent were operated upon within three years. The other 10 per cent were distributed in the period from four to seventeen years after the first operation. In 65 per cent of recurrences after cholecystostomy, the cause was failure to remove the gall-bladder. In 14 cases stones were present in the gall-bladder and cystic duct; in 2 there was a stricture of the duct, in 6 infection had recurred in the gall-bladder, and in 4 pancreatitis was present. Adhesions were the cause of recurrence of symptoms in 4 and the remainder were due to overlooked stones in the common or hepatic ducts. In cases of recurrence after cholecystectomy the group due to persistent infection was much diminished. In one case a duodenal fistula developed after operation and the remaining 6 were equally divided between strictures of the common duct and stones in the common or hepatic ducts. As regards end-results he believes infective conditions of the biliary tract are best treated by cholecystectomy.

Eisendrath (41) divides recurrences into (a) true, and (b) false. Under true he places

(1) those early cases which followed the placing of silk sutures in the gall-bladder; (2) those in which stones developed in the glands of Luschka; (3) those in which calculi formed in the intrahepatic and the common ducts. He concludes that true reformation of calculi may take place in the gall-bladder. Under false, he includes symptoms produced by: (1) overlooked calculi; (2) adhesions; (3) chronic pancreatitis; (4) persistence or recurrence of the original infection; (5) strictures; (6) fistulæ; (7) faulty technique, as suturing the gall-bladder to the abdominal wall and insufficient removal of the cystic duct in cholecystectomy; (8) incorrect diagnosis, as in tabes, etc.; (9) the co-existance of two conditions such as ureteral calculus with gall-stones; (10) contraction at the ampule; (11) cancer in the head of the pancreas. He quotes Deaver's (34) recurrences in 1,041 operations, 10 per cent being due to chronic pancreatitis. He himself reports 13 operations for recurrence of symptoms from causes mentioned above.

Stanton (152) also classifies recurrences as true and false. Under the former he considers the rare cases of true recurrence, and under the latter the clinical recurrences due to stones overlooked at the first operation. Kehr reports having overlooked stones in 2.5 per cent of 1,105 cases. Stanton believes that stones are overlooked at the first operation in from 2 to 19 per cent of the cases. He quotes Richardson as having never seen a case of true recurrence in all of his experience. In 1911 Kehr, in 1,780 gall-stone operations had 3 cases of true recurrence, one of them after cholecystectomy, but after choleystectomy and hepaticus drainage he never saw a case. In 245 gall-stone cases operated upon he found only 3 with a history suspicious of reformation and none of these were operated upon. If no foreign body is left in the gall-bladder or ducts after operation, recurrence of stones is rarely observed. He states that cholecystectomy affords no greater immunity against reformation than cholecystostomy.

Lund (95) in 347 operations on the gall-bladder and ducts observed 3 cases of true recurrence. Vaughan (158) reports 3 cases of undoubted recurrence and believes reformation is more common than is generally supposed. Kadian (85) reports a case of gall-stones with cholecystectomy. Six years later there was a return of symptoms. The second operation showed the cystic duct had dilated and contained several cholesterin stones. He found 28 cases in the literature similar to his own and thinks in his case a small calculus was left in the duct causing recurrence. He advocates ligating the cystic duct flush with the common in cholecystectomy. Deaver (33) says that stones left at the primary operation are the most important factor in recurrence. According to Kehr in long standing cases the ducts become dilated and stones may lodge in pockets which cannot be detected. Clark (22) reports a case in which at postmortem 7 large stones were found in the gall-bladder. The patient had been operated upon during the preceding year and bladder and ducts emptied of stones. He died of tuberculosis. This was a true recurrence. Foss (50), discussing Matheny's paper, cited a case in which he performed choleycstectomy. The gall-bladder had been drained three times previously and at the time of removal contained 500 small stones. This also was a true recurrence.

DIAGNOSIS

Babcock (5) believes that transient nocturnal attacks of indigestion in obese and middle-aged women are usually due to gall-stones. With this history, very violent attacks suggest empyema or gangrene of the gall-bladder, and these with shock, distention, and tenderness mean pancreatitis. In gastric or duodenal ulcer the symptoms usually last much longer. In acute cholecystitis the symptoms persist several days, are less severe, and between paroxysms weeks or months may elapse, during which time there is usually "dyspepsia." In ulcer there is food relief, while in cholecystitis and stone food increases and vomiting relieves the pain. C. H. Mayo (98) states that in strawberry gall-bladder the symptoms are often like those of duodenal ulcer,—recurring attacks of from one to three weeks' duration with prolonged intervals of improvement. The pain in these cases may be relieved by soda, as in ulcer. He believes the recurrence of attacks means the focus of infection is still active.

Nickell (110) says that the most difficult cases to diagnose are those in which the gall-bladder, stomach, and intestine are bound together by adhesions. In these there may be symptoms referrable to all three organs. Bodenstab (13) says that the diagnosis of gall-bladder disease rests almost entirely with the history and in 90 per cent of all cases a correct diagnosis can be made from that alone.

Lothrop (94) mentions under differential diagnosis of typhoid cholecystitis: (a) intestinal perforation; (b) right-sided pulmonary lesions; (c) perforation of gastric or duodenal ulcers; (d) appendicitis; and (e) acute pancreatitis. Ransohoff (127) says in the great majority of cases of

gangrene of the gall-bladder, the diagnosis of appendicitis is made.

Bevan (10) considers a carefully obtained history of greatest importance in diagnosis; he excludes other conditions by elimination; he also takes into consideration the physical examination, the laboratory tests, and X-ray findings, which are of little value for reasons before stated. He also lays great stress upon the theories of probabilities in making a diagnosis of lesions of the upper right quadrant. Courvoisier's law is of great value in jaundiced common duct stone cases, the gall-bladder being contracted in 80 per cent, while in jaundice from carcinoma of the pancreas it is dilated in 80 per cent.

Einhorn (39) reports his results with the duodenal tube in the diagnosis and treatment of gall-stone disease. He examined the bile directly and diagnosed probable cholecystitis by this means, in conjunction with the usual symptoms in 40 cases; 13 were operated upon. Of these 8 had gall-stones, 1 showed clear bile, and the other 7 a turbid duodenal fluid; 5 showed turbid fluid in extrabiliary tract lesions. He says when turbid bile is found in the fasting condition, cholecystitis with stones is usually present. The inconstancy of his findings shows that the method must have little value in the diagnosis of gall-bladder disease. Rehfuss (128) uses a tube devised by himself for obtaining the duodenal contents. He claims that bile is always found in the case of stones, no matter how deep the jaundice, whereas in obstructing tumors it is absent. He says the fæces are acholic in duct obstruction, with great increase in neutral fats.

Cholesterol estimation. Rehfuss (128) in 80 cases, 36 of which proved to be cholelithiasis, found an increase of cholesterol in the serum over the normal of 0.0016 to 0.0018 per cent. There is also an increase in nephritis, syphilis, diabetes, typhoid, tuberculosis, cancer, and the acute infectious diseases. According to Reimann and Magoun (130) a high cholesterol content has not helped in the diagnosis of gall-stones, because many other upper abdominal lesions give higher readings. Henes (72) reports in detail 38 cases to show that in the great majority of cases of cholelithiasis there is a hypercholesterinæmia. He thinks a cholesterol estimate is more valuable than the X-rays. In only 3 cases in a series of 128 did the cholesterol estimate not foretell the condition found at operation.

Roentgenology. In 1913 Case (26) was able to detect gall-stones in 50 out of 1,000 cases examined by the X-rays and during the same year Cole found 20 out of 409. Pfahler estimated that he could detect gall-stones in 74 per cent. At the time their article was written Cole and George claimed they could diagnose gall-stones roentgenologically in all cases. Their technique was not radically different from that employed in soft tissue detail but required great attention to minute points. They advocate the use of the Coolidge tube and an extremely small cone, showing only a limited area on each plate. If the plates are negative, the gall-bladder, stomach, duodenum and colon should be examined for adhesions. For detecting calculi the matching of shadows together by superimposing one plate over another is the most valuable. Roentgenographically, gall-stones are divided into two groups: stones that contain considerable calcium, which can easily be shown; and stones which contain none or only a trace of calcium. When the calcium coating is thin, which is the case in about 50 per cent, the stones are difficult to detect, while with increased density of the coating the ringlike appearance is more marked and easy to discover. In persons under twenty-five the coating usually is not dense and the stone is so soft that it does not show even a dim peripheral ring. Cole (26) states it is "safe and sane" to diagnose gall-stones when they are composed of calcium or have a definite calcareous coating or nucleus. By submerging gall-stones in bile and making radiographs of them, he found those with no calcium gave a "negative shadow," e. g., less than the shadow of the bile. By submerging a gall-bladder full of bile and stones under water, which has about the same density as human flesh, he found the calculi gave negative shadows but each was surrounded by a ring produced by the bile, which was of greater density than the stones. The most difficult stones to detect were those which had a nucleus of calcium surrounded by a cholesterin coating. In his experiments he used a stone which contained just enough calcium to show in the living subject, and this was the basis for his comparisons. Twenty per cent showed more calcium than the keystone, 26 per cent a trace of calcium less than the keystone, and 54 per cent practically no calcium but nearly pure cholesterin. Pure cholesterin stones are much less dense than the bile surrounding them and appear like bubbles of air.

Pfahler (120) concludes that by good technique and careful observation gall-stones can be shown by the X-rays in more than 50 per cent. He often finds evidences of stones in only one or two plates of a series. His technique is to vary conditions as regards time of exposure and degree of vacuum.

Niles (111) says the intestinal canal should be thoroughly emptied when X-ray plates are made for gall-stones and no solid food taken for fifteen to eighteen hours previously.

O'Brien (113) quotes extensively from American and European literature in regard to roentgen ray diagnosis of gall-stones and gives some of his own observations. He thinks saline catharsis and fasting are valuable preparatory measures, though roentgenoscopy has no place in direct diagnosis. George and Leonard (56) believe that only when some pathologic change has taken place in the wall of the gall-bladder or its contents can shadows be demonstrated by the X-ray. These changes may be thickening of the wall, a concentration of the bile, or the presence of stones.

As regards the differential X-ray diagnosis between renal and biliary calculus, Cole (25) draws these conclusions: In renal calculus the shadow is uniformly dense and usually single. If multiple, the shadows conform to the pelvis and calices and the stones vary in size and shape. In biliary calculus the shadows are of variable density, as a rule multiple, conforming to the shape of the dilated gall-bladder. Renal calculi are usually sharper and smaller with the plate posterior; biliary calculi, with the plate anterior. He suggests a barium meal to demonstrate the position of gall-stones.

Carman (21) reports a case in which communication existed between the first portion of the duodenum and the gall-bladder; diagnosis was made by means of the barium meal. The case was one of carcinoma of the stomach. Caldwell (19) believes that in only a small percentage of cases, and then only when the gall-stones contain a sufficient quantity of mineral salts, will X-ray plates show definitely the presence of stones. He thinks that faulty conclusions are likely to be drawn from X-ray plates and the clinical indications of cholelithiasis are accurate enough to make a diagnosis. Probably from 50 to 60 per cent of cases are submitted to X-ray examinations and of these perhaps one-tenth will give reliable shadows of gall-stones. In the other nine-tenths the plates will show some hazy or suspicious shadows, some of which may be due to stones and many to other causes, even where stones are actually present. In this way the value of the X-ray may easily be overestimated. Deaver (32) believes very little help is to be derived from laboratory or X-ray findings. Too much confidence may be placed in an X-ray diagnosis, influencing the patient as well as the doctor to procrastinate, because in gall-stone disease the danger is due to infection rather than stones. C. H. Mayo (100) says that too much dependence placed upon the X-ray diagnosis of gall-stones would be a backward step of many years.

PROGNOSIS

Hubbard and Kimpton (77), among 226 operated cases, report that pulmonary complications developed in 14, and usually caused death; 31 died in the hospital as a result of or in spite of operation. The end-results were ascertained in 91 cases; 74 were well after operation, but 5 still had "some indigestion"; 4 were having trouble which was not considered due to gall-bladder disease; 3 continued to have attacks of pain which "might be due to gall-stones," and one was "not well." In Lichty and Zurhorst's (92) report 137 patients were operated upon, 83 were cured, 13 relived, 8 not benefitted, 11 died within a month of operation, and 14 could not be traced. Of the 11 deaths, 6 were common duct cases and 5 simple gall-bladders. Of 8 who died later than one month, 4 died from causes other than gall-stones. Of the 54 operated patients having cholangeitis, 22 were cured, 10 relieved, and 13 not benefitted; two died within a month after operation and 2 others several years later from other causes. The pathology of these cases varied from simple chronic cholecystitis and pericholecystitis to suppuration and gangrene. Of 421 unoperated cases treated medically the mortality was very little higher than those operated upon and because of suffering during attacks, anxiety, formation of drug habits, and the limited diet necessary, the patients led almost useless lives.

Babcock (5) thinks that during the first stage of cholecystitis the operative mortality should be under 1 per cent, in the second 3 to 5 per cent, and in the third it may be as high as 20 per cent. He thinks present-day surgery is twenty to thirty years behind the pathology of gall-bladder disease. Since 1912 he has drained the third stage cases under local anæsthesia.

Tilton (154) says that the poor results which sometimes follow gall-bladder operations are due to long delay, which has caused extensive and incurable anatomical changes. Extensive adhesions, displacements of the stomach and duodenum, etc., must in many instances remain after operation, causing functional disturbances and pain. Eichmeyer reports from the clinic of Cörte 316 cases, 134 complicated by common duct involvement requiring drainage of the hepatic duct. Of these, 78 were of a purely mechanical nature and 5 were fatal; 46 had severe

or malignant irremedial complications, and 36 were fatal. All should have had early surgical treatment as indicated by symptoms, which appeared from three to thirty-five years previously. He states that mortality from malignant disease of the gall-bladder alone is higher than from early operation. Chronic nephritis, severe jaundice, and myocarditis are complications which give the chief mortality in late gall-stone operations.

Hubbard (76) reports a series of 220 cases of cholelithiasis operated upon with 31 deaths. Of the 31, the gall-bladder was inflamed, perforated, necrotic, or contained pus in 8 and stones were found in the ducts in 16. The causes of death were sepsis, pulmonary complications, and progressive general weakness. He says the mortality of cholecystectomy or cholecystostomy was between 3 and 4 per cent.

Deaver (32) gives the mortality for his entire series of 1914 as 6.3 per cent. In the uncomplicated cases it was 4.5, in the common duct cases 5 and in gall-bladder disease plus pancreatitis 9 per cent. Over half the deaths may justly be attributed to delay as well as to operation. He thinks the mortality of cholecystectomy should not be higher than that of cholecystostomy. Cholecystectomy alone or with appendectomy, choledochostomy, etc., was done in 115 cases with a mortality of 5.2 per cent. Cholecystostomy was done in 40 cases with 1 death. He says (35), concerning cholecystostomy versus cholecystectomy, that the mortality in either is as nothing compared to that due to the local disease and general condition of the patient.

Peterson (119) in 135 patients with gall-stones, among 1,066 pelvic operations, obtained the following results: Following the removal of stones there were 2 deaths due to the pelvic condition; 90 per cent had no subsequent symptoms referrable to the gall-bladder. Where the stones were not removed, 30 per cent suffered subsequently from gall-stone attacks or symptoms referrable to the gall-bladder.

Buchanan (15) carefully studied 300 personal cases and was able to trace all but 18. All were cholecystostomies excepting 10 and no common duct stones were included. The percentage cured was for cholecystostomy, 78.5 per cent, for cholecystectomy, 90 per cent.

C. H. Mayo (98) has published tables showing the results of cholecystectomies and cholecystostomies for eight years previous to 1915. The mortality of cholecystectomy for three years was 1.2 as against 3.4 per cent for cholecystostomy. The 242 cases of cholecystostomy were traced, none of them more recent than one year; 53 per cent were cured, 39 improved, and 9 not improved. Of 219 cases of cholecystectomy heard from, none more recent than one year, 71 per cent were cured, 22 improved, and 7 not improved. In a later paper (99) he gives the results following cholecystectomy from November 1, 1915, to October 1, 1916. In this series were 776 cholecystectomies with a mortality of 1.77 per cent. During the same period (100) 43 cholecystostomies were performed with a mortality of 14 per cent, one-half of the deaths being due to cancer. In addition there were 102 choledochostomies with a mortality of 7.84 per cent. Judd (81) states that during 1913, 21 patients were operated upon for strawberry gall-bladder without stones, 17 being cured by cholecystectomy. He recently succeeded in securing reports from 10 gall-stone patients on whom cholecystectomy had been performed more than fifteen years previously. All excepting two remained well and free from gastric symptoms.

Robinson (134) quotes the Mayo statistics of 4,000 gall-bladder operations, with an average mortality of 2.75 per cent. He says W. J. Mayo advocates operation in all cases of gall-stones as soon as the diagnosis is made, whereas Kehr operates only in two types of cases, one with "vital" and the other with "relative" indications. In the latter group the symptoms are long continued and there are frequent attacks of biliary colic.

Willis (166) in 549 operations for cholelithiasis had a mortality of 2.2 per cent. Of these there were 398 cholecystostomies with a mortality of 1.7 per cent and 107 cholecystectomies with 0.9 per cent. There were also 44 choledochotomies with 4 deaths. He believes cholecystectomy should be performed without drainage.

Graff and Weinert (59) sent out questionnaires to 130 patients on whom they had performed cholecystectomy for gall-stones. Of these 73.4 per cent were cured, 4 had symptoms of overlooked stones, 8 gastro-intestinal symptoms, and 12 trouble due to adhesions. Collins (27) traced the results in 102 cases out of 147 cholecystectomies performed; 74 remained perfectly well, 15 complained of pain in the gall-bladder, stomach or both, and 13 still had attacks of pain in the right upper quadrant. Schultze (145) reports 21 cholecystectomies, all of which recovered.

Lothrop (94) says that in typhoid cholecystitis the prognosis is much better when the cases are operated upon early, because in the late stages mixed infection and cholangeitis add to the danger. The mortality in various stages of operated

perforation runs from 22 to 54 per cent. In a series of 154 cases, 25 per cent of those perforated and all those not operated upon were followed by fatal peritonitis. Price (126) says that the majority of cases complicating typhoid are overlooked until perforation of the gall-bladder has occurred. He quotes Ashhurst who in 1908 collected 21 cases, with a mortality of 61 per cent. Of 11 operated cases among 154 collected by Thomas, the mortality was 54.6 per cent. The author in 1908 had collected 9 cases of cholecystitis complicating typhoid which had been operated upon and all recovered.

MEDICAL TREATMENT

Very little space will be devoted to this subject, but there are a few points appearing in the literature that seem worthy of mention as adjuncts to surgical treatment.

Gerster (57) cites Schimilinsky, who in 1912 reported a case of common duct obstruction following resection of the stomach with gastroenterostomy, in which the patient's health was greatly improved by the feeding of his own bile. All of the bile discharged from the fistula, 1,000 ccm. in twenty-four hours, was introduced into the stomach twice daily by means of a stomach tube. The improvement was so marked after two months that it was possible to make an anastomosis between the fistula and the jejunum. The patient recovered. He cites a case of his own of pericholecystic abscess, cholecystitis, and complete obstruction of the common duct by stone. He first drained the abscess and did cholecystectomy without removing the stone. After a stormy convalescence, complicated by cholæmic oozing, an afebrile stage was reached with great emaciation. All the bile was then collected from the fistula, and introduced into the stomach twice a day. Such marked improvement followed that after two weeks he was able to do a secondary operation. This patient also recovered. He concludes that the administration of bile in physiologic quantities is indicated in obstruction of the common duct.

Robinson (134) believes that among the well-to-do, who are not obliged to work daily, medical treatment is indicated in the early stages. His treatment is: (a) dietetic, in which all fats and alcoholics are eliminated, sugars limited, and vegetables freely employed; (b) laxatives, Carlsbad water, etc.; (c) daily exercise; and (d) hexamethylamine. Boas (12) thinks it is a mistake to give morphine in gall-stone colic, as the pain can be relieved by hot drinks, hot applications, etc. He believes large meals, especially at night, should be avoided. Patry (116) believes that the majority of cases of gall-stones should be treated medically, except where there are acute complications. Einhorn (39) reports a number of patients with cholecystitis in which he introduced into the duodenum by means of a tube weak solutions of ichthyol and argyrol. The results were very inconstant. He also used with some benefit in 20 cases duodenal alimentation for the relief of gastric and duodenal ulcers complicated by gall-stones.

SURGICAL TREATMENT

This very important phase of the subject will be discussed in the most logical way possible, giving the different views of the various authors under headings which follow each other in logical sequence. Generalization will be left for the reader.

Lichty and Zurhorst (92) advocate early operation in all cases of gall-bladder disease. Hubbard (76) also believes that operation should be done in every case of cholecystitis or cholelithiasis as soon as the diagnosis is made. Tilton (154) believes the type of operation which should be employed depends upon the severity of the case, condition of the patient, and the experience of the surgeon. Ross (139) thinks all gall-bladder and duct diseases should be treated surgically. Lothrop (94) says in regard to typhoid cholecystitis if the local signs progress and the gall-bladder becomes palpable, operation should always be done, but if possible should be avoided. Burke (18) in discussing gall-bladder operations during pregnancy says there is but little danger of abortion occurring. He places much reliance as an indication for operation on jaundice, which is more common in pregnant women than in others. Borelius (14) advocates early operation in all cases. Peterson (119) says it is questionable practice to explore the gall-bladder in operations for inflammatory pelvic lesions prior to breaking down the limiting adhesions. In pelvic operations for malignant disease the gall-bladder should not be removed at the same time.

Relative frequency of cholecystectomy. Hubbard and Kimpton (77) in a study of 226 operated cases of gall-stones report that cholecystostomy was performed in 177 and cholecystectomy, partial or complete, in 44.

Indications for cholecystectomy. In the opinion of C. H. Mayo (98) cholecystectomy is indicated where there are adhesions about the gall-bladder or where infection persists. He also says (97), given sufficient symptoms for surgical intervention, if the lymph-glands along the ducts are

enlarged, without disease of the duodenum or pancreas, the gall-bladder should be removed, whether stones are present or not. In case of papilloma of the gall-bladder the organ should always be removed. As regards the advisability of cholecystostomy or cholecystectomy (100) he asks the following questions: In which operation is the mortality higher? Is the average relief obtained by cholecystostomy as great as that following cholecystectomy? He says that cholecystostomy gives a high percentage of cures if the infection subsides and leaves only stones, but when cholecystitis is present, a removal should always be done. As indications for cholecystectomy he gives: (a) cystic gall-bladder; (b) empyema; (c) strawberry gall-bladder or cholecystitis sufficient to cause symptoms. Cholecystostomy gives a high percentage of cures when the disease is slight, stones present, and gastric symptoms absent. Cholecystostomy is also indicated in associated pancreatic disease, pregnancy, or in old people where the resistance is low.

Deaver (32) favors cholecystectomy in practically all cases, but in addition he drains the common duct by means of a T-tube. He regards drainage as the most essential part of an operation on the biliary tract and thinks it should be prolonged. He believes cholecystectomy as safe as cholecystostomy. In another article (35) he says that cholecystostomy will not cure all cases of gall-blader disease and in hydrops, empyema, or impacted stone in the cystic duct the gall-bladder must be removed. As regards end-results, infective conditions of the biliary tract are best treated by cholecystectomy. Cholecystectomy in the presence of jaundice and in the absence of marked changes in the gall-bladder is out of place; cholecystostomy is then to be preferred. He lays stress upon the more constant presence of adhesions after cholecystectomy than cholecystostomy.

Kehr (86) thinks the only prophylaxis against cancer is early cholecystectomy for chronic cholecystitis. Babcock (5) advises cholecystectomy in the first stages of gall-bladder disease but warns against injury to the ducts. In one of his cases he had a fatal leakage of bile and in another he punctured the hepatic duct. Since then he had 114 cholecystectomies in the first stage without any mortality. Erdmann (46) advises cholecystectomy in practically every case of gall-bladder disease. Porter (125) gives his indications for cholecystectomy as follows: (a) hydrops; (b) calcareous or fibrous degeneration; (c) chronic empyema; (d) the so-called strawberry gall-bladder; (e) carcinoma; (f) extensive laceration or perforation; (g) extensive gangrene. In all other cases he does cholecystostomy. Fowler (53) believes that gall-bladder disease is a progressive inflammation from the beginning and should be treated by early cholecystectomy.

Tilton (154) says that in general cholecystectomy is to be preferred, though in some very acute suppurative or gangrenous cases it is better to do a cholecystostomy as a life-saving measure.

Guthrie (66) sent questionnaires to 45 prominent surgeons regarding cholecystectomy and cholecystostomy. The questions and answers follow: (a) What percentage of cases of cholecystostomy had recurrence of trouble? Thirteen answered, "a few recurrences." (b) Are you performing cholecystectomy more frequently than in the past? There were 36 answers of "yes," 7 of "no." (c) Have the results of cholecystectomy been better than those of cholecystostomy? Again 36 "yes," 7, "no." (d) In what cases do you consider cholecystectomy the operation of choice? The majority answered, "any disease of the gall-bladder wall or damage to the cystic duct." (e) What are the contra-indications to cholecystectomy? The most common answer was "pancreatic disease and empyema." (f) As a rule do you treat acute empyema by cholecystectomy or drainage? Thirty-three favored drainage. (g) How does the mortality of cholecystectomy compare with that of cholecystostomy? Eighteen reported the mortality the same; 21, the mortality of cholecystectomy higher.

Porter (124) quotes Lane as saying that cholecystectomy is the operation of choice in cholelithiasis.

Lund (95) says in cholecystitis without stone, there is often a thick-walled gall-bladder adherent to the pylorus, omentum, colon, etc., and in these cases cholecystectomy should be done. He also recommends it in acutely inflamed or gangrenous gall-bladders if the patient's condition is good. He believes that if the common duct is subjected to trauma, the gall-bladder if not too much thickened should be saved for cholecystenterostomy. In undoubted pancreatitis with jaundice the gall-bladder should be saved for cholecystenterostomy or external drainage. He believes the bladder should be removed in cases of cholecystitis to prevent the development of pancreatitis. His indications for cholecystectomy are the same as those already mentioned.

Lane (87) advocates cholecystectomy in all

cases of cholecystitis, principally because of the immediate and uninterrupted convalesence which follows the operation.

Smith (150) says that he formerly performed cholecystostomy in gall-bladder infections but that more recently he is inclined to favor cholecystectomy. He thinks that it is particularly indicated in phlegmonous inflammations of the gall-bladder. If the infection has extended to the pancreas he would retain the gall-bladder for drainage. Frank (55) considers that cholecystectomy is indicated in all cases of cholecystitis and in 80 per cent of cholelithiasis. He believes that in many cases of common duct stone with cholangeitis, the high mortality is due to trauma of the nerve supply of the liver. On this basis he uses gas oxygen anæsthesia with complete nerve blocking, dividing the operation into two stages, complete drainage of the gall-bladder and later removal of the obstruction from the duct.

Schultze (145) favors cholecystectomy in practically all cases, except when the patient's condition is very bad. He thinks the common duct should be drained in these cases only when it contains stones or shows dilatation.

Gil (58) gives his indications for cholecystectomy as follows: (a) when the gall-bladder is severely inflamed and the mucosa ulcerated; (b) when it is contracted, contains a stone, and the cystic duct is obstructed; (c) to cure an external fistula; (d) sometimes in connection with choledochotomy. Roman (135) concludes after operating upon 2,000 cases for gall-bladder and duct disease that cholecystectomy is the operation of choice. Bevan (10) advocates cholecystectomy where there are stones in the gall-bladder or cystic duct and limits cholecystostomy to those cases where the gall-bladder is but little diseased, or to cases which are poor surgical risks. He does not recognize a so-called strawberry gall-bladder which demands removal. Dennis (38) thinks cholecystectomy should be performed in empyema unless the general condition is very bad.

Leede (89) concludes that when free HCl is not found in the stomach in gall-bladder disease, cholecystectomy should be performed, but if present, cholecystostomy.

In typhoid cholecystitis Price (126) thinks the gall-bladder should be drained or removed as soon as the diagnosis is made. Swope (153) secured 98.6 per cent cures after cholecystectomy, whereas after cholecystostomy there were only 74.8 per cent cured, the remainder being no better and many worse than before operation. Where adhesions are extensive or in acute suppurative cholecystitis he advocates cholecystostomy.

Lilienthal (93) says that in gynecological cases where there are gastric symptoms and a fibroid, if stones are present he first does cholecystectomy and operates upon the fibroid later.

Indications for cholecystostomy. Under the preceding heading many of the indications for cholecystostomy have already been mentioned. Those which follow have special reference to the operation as distinguished from those for cholecystectomy.

Babcock (5) recommends cholecystostomy in the third stage of gall-bladder disease, where the condition is not good and the difficulties are great. Coffey (23) advocates conservatism in dealing with suppurative or gangrenous cholecystitis. C. H. Mayo (98) says that patients with stone in the gall-bladder where the infection has subsided can be completely relieved by removal of the stones and drainage. According to Judd (81) cholecystostomy should be the operation of choice where the infection is in the bile only and the tissues of the gall-bladder are healthy.

Lund (95) recommends cholecystostomy in acute cholangeitis in which removal would be difficult or the patient's condition is poor. He also thinks it or cholecystenterostomy is indicated in pancreatitis with jaundice or where the common duct is strictured or likely to become so. Cowden (29) quotes Crile as saying that when the gall-bladder appears normal and the cystic duct pervious, cholecystostomy is the operation of choice and will not be followed by a return of symptoms. Buchanan (15) states that the worst that may happen after cholecystostomy is a second operation, and this will seldom occur. Mapes (96) thinks cholecystectomy is unwarranted except where the gall-bladder has been greatly damaged or is cancerous.

Shaw (149) says that when the common duct is involved it is good practice to conserve the gall-bladder for drainage if the cystic duct is patent. Where the gall-bladder has a long redundant fundus, the excess portion should be amputated and a cholecystostomy performed.

Grant (62) reports 2 cases of perforation of the gall-bladder and in his discussion advocates cholecystostomy in the majority of cases because the gall-bladder has a definite function and drainage is much easier and less dangerous than removal. Gil (58) says choledochotomy and cholecystostomy are indicated in retained stone in the common duct. After extraction of the calculus the duct is sutured and a cholecystostomy performed.

Rovsing in discussing the paper of Borelius

(14) says the gall-bladder is sterile in over one-half of the cases of stones, and any infection is secondary. Borelius drains through the cystic duct in cholangeitis. Borchgrevink prefers cholecystostomy in all cases and would rather do it repeatedly than remove the gall-bladder.

Incisions for operation. Babcock (5) advocates a simple transverse incision along a line slightly below the ninth rib. For better exposure he recommends Perth's triangular flap incision vertically through the right rectus muscle for three or four inches, then transversely to the ribs, suturing the muscle to its fascia before cutting the transversalis. In some cases he uses the simple oblique incision after the plan of Kocher. McArthur (103) describes an incision for gall-bladder surgery as follows: through the right rectus muscle, cutting the fascia, preserving the inervation by blunt dissection and incising the posterior sheath nearly transversely. When the operation is finished, the edges of the posterior sheath are whipped together with continuous catgut. Bevan's (9) incision is S-shaped, beginning at the ensiform cartilage, curving to the right to the middle of the rectus, carried down over its center four to six inches and then curving concavely to the right, completing the S. The rectus muscle is split, exposing the transversalis and internal oblique, which with the peritoneum, are divided through the same length as the original incision. He does cholecystectomy in 90 per cent of the cases. W. J. Mayo (102) modifies Bevan's incision, beginning at the ensiform cartilage, extending directly downward one and one-half inches, and then dividing the upper half of the right rectus on a line with the costal margin and about one inch from it. He uses this in secondary operations. Judd (81) extends the incision to a point two inches to the right of the umbilicus through the superficial and deep fascia. After entering the peritoneum he cuts the suspensory ligament of the liver, uses the end as a tractor, and when through sutures the ends together.

Fobes (49) says that gall-bladder and appendix work can be done through the lumbar incision usually used for kidney operations. With it hernia is practically unknown, and the right kidney can be reached if necessary. The thoracic nerves (149) bear the same relation to the lineæ transversæ as to the ribs. This should be remembered in gall-bladder operations.

Technique of cholecystectomy. Deaver (34) describes the following method: The free border of the gastrohepatic omentum is freed of adhesions, the edges of the wound widely retracted, and the liver and gall-bladder pulled downward, forward and then upward, making taut the cystic duct and gastrohepatic omentum. The diverticulum at the junction with the cystic duct is grasped with forceps and traction made, separating it from the border of the gastrohepatic omentum to avoid injury to the common duct. A small incision through the omentum exposes the cystic duct, which is clamped with forceps and divided with a cautery. The common duct is now explored for stones, the cystic artery clamped and divided, and duct and artery ligated separately. The gall-bladder is next dissected from the liver from within outward, uniting the edges of its bed with catgut as dissection progresses. In this way the operation is bloodless and the liver surface covered by the time the gall-bladder is out. The incision in the omentum is closed but the stump of the cystic duct not covered. A small rubber tube is carried down to the stump of the cystic duct and retained for four or five days. When the common duct is to be drained, it is opened and a T-tube introduced. He recommends early drainage of the common duct as a cure for pancreatic diabetes.

Judd's technique is based on the possibility of hæmorrhage and injury to the common duct. He performs the operation from below upward as follows: an oblique incision through the abdominal wall; adhesions to the liver are separated; forceps are applied to the fundus of the gall-bladder and traction made; a second forceps grasps the neck of the gall-bladder pulling the lower part away from the cystic duct and exposing the common duct; the cystic duct and artery are freed and two forceps applied including both in one grasp; the cystic duct and artery are divided with ligation of both in one catgut ligature; traction is made on the upper of the two forceps on the cystic duct, and the gall-bladder is separated from liver; a continuous catgut suture approximates the edges as the gall-bladder is removed; a cigarette drain is inserted to the cystic duct.

Seelig (146) advocates the removal of the gall-bladder from without inward. He says that in cholecystectomy there are three sources of hæmorrhage, from the liver, from branches of the cystic artery, and from the cystic artery itself. By beginning the dissection at the liver edge, hæmorrhage from the first source is controlled by a small gauze pack. Bleeding from the branches as the separation proceeds is often an advantage in finding and ligating the main vessel. By this method the gall-bladder may be used as a tractor in exposing the bleeding vessels and

grasping them without danger to the ducts. Another advantage is that the cystic duct can be traced to the hepatic by exerting a little traction. The author lays stress on exploring the cystic and common ducts with a probe before ligating the former.

Willis (166) says that in all cases after cholecystectomy there are extensive adhesions, and his experiments show that even healthy bile if spilled will produce them. The combination of infected bile leakage with drainage of any kind is always followed by dense, widespread adhesions, and his technique is based on the elimination of both. He incises the hepatico-duodenal ligament, dissects out the cystic duct, pulls it upward and ties it flush with the common duct with catgut. Another ligature is applied to both cystic duct and artery, after which he cuts the duct between the two and the artery to the distal side and removes the gall-bladder from within outward, leaving peritoneal flaps. He then covers the stump of the duct and artery with a continuous suture which comes forward, uniting the peritoneal flaps. Phemister (121) describes a method of controlling hæmorrhage in cholecystectomy performed from without inward. He first separates adhesions, locates the cystic artery and duct, and clamps both at the point where they are to be ligated. The gall-bladder may now be removed without hæmorrhage from the branches of the artery, and when the forceps is reached the ligature is applied.

Richter (132) in discussing the technique calls attention to the following points: A peritoneal flap is left on both sides to cover the denuded surface. These flaps should not be sutured together but made to lie on the raw surface where they will adhere like Thiersch grafts. He thinks oozing is more important than adhesions. He crushes the cystic duct, ligates it with catgut, and closes the abdomen without drainage. The stump of the duct should not be buried because of the danger of retroperitoneal infection. Araya (3) advocates fixing the transverse colon between the bile passages and the abdominal contents to prevent adhesions. Gwathmey (67) covers the stump with peritoneum in most cases and has seen no bad results. Phillipowicz (123) says there is a difference of opinion as to the advisability of drainage of the common or hepatic ducts with cholecystectomy. He does not drain if there are no symptoms of infection of the duct. Most operators use the T-tube for drainage. If the stone is in the pancreatic or duodenal portion, Kocher's mobilization of the duodenum should be done. If the occlusion cannot be overcome, an anastomosis should be made with the stomach, duodenum, or jejunum.

Technique of cholecystostomy. Buchanan (15) agrees with Crile that in severe infections the gall-bladder should be primarily drained and later removed if necessary. He anchors the gall-bladder to the peritoneum before opening it and has seen no trouble following this procedure. He always makes an overstitch in the gall-bladder with catgut and ties this tightly around the tube. If the bile flows freely within a few days, the majority of cases recover quickly because the cystic duct is patent. Williams (165) describes a zigzag purse-string suture for cholecystostomy, the object being to invert the edges and bring the peritoneal surfaces in contact with the tube, and with each other after its removal. It amounts to nothing more than a continuous suture through all the walls, passing in and out at different levels from the cut edge. Shaw (149) also uses an infolding stitch for cholecystostomy, the alternating stitches being on different levels on the opposing sides. Rhodes (131) reports a series of 133 cases of cholecystostomy in which he shortened the time of drainage six days by administering hexamethyltetramine after operation in doses of from 50 to 80 gr. daily.

Indications and technique for choledochotomy. Eisendrath (41) lays stress upon the possibility of stones in the common or hepatic duct escaping detection at operation. In these cases the calculi are in the retroduodenal division. He quotes Kehr as saying that in 40 per cent of the cases in which palpation of the common duct was negative, stones were found in the retroduodenal portion. In 20 per cent of his cases common duct stones did not produce characteristic symptoms. In 30 cases where palpation was negative, stones were found in 10. He gives the following indications for exploration of the common duct: (a) many small stones in the gall-bladder or cystic duct; (b) enlarged thick-walled common duct; (c) chills, fever, or icterus; (d) recurrence of pain or symptoms of cholangeitis after previous operation. Tilton (154) says that in chronic retention of stone in the common duct operative treatment is always indicated. Judd (83) does not think it advisable to open the common duct for exploration unless stones can be palpated or the clinical features suggest that stones or infection are present. Eisendrath's (41) method for choledochotomy is through a right rectus incision. Calculi in the gall-bladder are removed and the opening closed with a forceps. By making traction the ducts are brought into view, adhesions are separated, the hepatico-

duodenal ligament is identified and the peritoneum over the common duct is divided. Two traction sutures are inserted in the wall of the common duct and it is incised. Stones are searched for by means of a spoon which passes up into the hepatic ducts and down into the ampulla. A flexible probe is passed through the papilla into the duodenum and drainage of the common duct is effected by a T-tube. The opening of the duct is closed around the tube with fine catgut and cholecystectomy is then performed.

Harrigan (70) describes Kocher's method of mobilizing the duodenum for exploration of the retroduodenal portion of the common duct. The posterior peritoneum is incised where it passes from the duodenum to the anterior surface of the kidney. By freeing the duodenum in this way the duct is carried with it and may be directly palpated. The chief value of the mobilization is that the stone may be pushed up into the supraduodenal portion. The author describes a method of removing calculi impacted in the ampulla. He holds the duodenum forward, indirectly lifting up the pancreas and makes a small incision through the pancreas directly over the stones. A cigarette drain is then placed in Morrison's space and cholecystostomy performed. He found in the literature 3 other cases of transpancreatic choledochotomy, 2 of which recovered and 1 died. There is very little danger of hæmorrhage, injury to the duct of Wirsung, or pancreatic fistula, though he admits these are objections.

Duodenotomy. Todd (155) in an article on duodenotomy for common duct stone cites 128 cases from different operators up to February, 1915, with 9 personal cases. There was 1 death among the latter. The indications for duodenotomy are stone in the ampule of Vater, or low in the common duct. He cites McBurney as having done the first operation in 1891. The chief reason for performing duodenotomy is inability in certain cases to mobilize the gut because of adhesions. He incises the duodenum, removes the stone from the ampulla and then closes the intestinal opening by means of two layers of sutures.

Cholecystenterostomy. Shaw (149) gives the following essential conditions for successful cholecystenterostomy: (a) a patent cystic duct; (b) the gall-bladder must be capable of maintaining a tubular function; (c) if possible a cholecystduodenostomy should be performed; (d) cholecystjejunostomy is easier and should be done in malignant cases; (e) a large opening should be made; (f) Morrison's pouch should be drained; (g) cholecystcolostomy should not be done. Erdmann and Heyd (47) say that in carcinoma of the bile-ducts a cholecystgastrostomy should be performed because cholecystenterostomy may produce kinking and cholecystcolostomy always carries with it the danger of ascending infection.

Cholecystgastrostomy. Barr (6) reports a case of cancer of the pancreas with obstruction of the common duct in which he performed anterior cholecystgastrostomy. The patient had little reaction afterward and was relieved from the most distressing symptoms. He says the operation is easily performed and is satisfactory in its practical results. Jacobson (79) has collected from the literature 16 cholecystgastrostomies and records a case of his own. He concludes that it is the operation of choice in malignant disease, as the bile does not interfere with digestion and there is no danger of ascending infection.

Anastomosis of the common or hepatic duct with the small intestine. W. J. Mayo (102) has made direct union of the common duct to the duodenum by Coffey's method, several times after operations for cancer. Walton (161), writing on irremovable obstructions of the common duct, divides the cases into two classes: (a) where the gall-bladder cannot be anastomosed and there is no biliary fistula; here there is always dilatation of the common duct; (b) where there is no gall-bladder but a biliary fistula with no enlargement of the common duct. In the first class the duct is easily united to the duodenum by button or suture. In the second group there is great difficulty, and two types of operation are advocated; first, hepatico-duodenostomy or hepatico-jejunostomy, where a portion of liver is excised and the opened small intestine sutured into the defect with the hope that some of the intrahepatic ducts will drain into the intestine. The danger here is from infection. The second type consists of dividing a loop of jejunum, implanting the proximal end into the side of the distal and passing the proximal end of the distal segment subcutaneously into the side of the biliary fistula. The danger here is that a fistula may persist. The operations dealing directly with the common duct are, first, the use of autogenous grafts, as the patient's appendix, a segment of vein, or a tube of fascia; these are most uncertain when applied to the human subject. Second, direct implantation as performed by Mayo, Packard, and Harrington. The former has successfully united the hepatic duct to the duodenum by a

two-row suture anastomosis after the plan of a gastro-enterostomy. When this cannot be done, the method of Sullivan is the best. He inserts a rubber tube into the stump of the common or hepatic duct, carries it into the duodenum and surrounds it with omentum. After the tube passes, a fistulous tract is left. The only objection to this is the possibility of fibrous contraction taking place. The author describes an operation in which he turns down a flap of duodenum, sutures a rubber tube into the end of the common duct, closes the opening in the intestine around the tube and forms a new duct by suturing the duodenal flap around it. He thinks this is the operation of choice. Hagler (68) reports a case in which he successfully employed Sullivan's method under very adverse conditions. The final result was perfect. Riggs (133) reports a case of carcinoma of the end of the duct in which he removed the tumor and implanted the duct into the duodenum. Capelle (20) records a case presenting the symptoms of obstructive jaundice. At operation the head of the pancreas was hard and nodular. He cut the common duct close to the pancreas and implanted it into a loop of jejunum, which he fixed to the mesocolon, and then performed cholecystectomy. The patient recovered and remained well.

Holmes (74) believes that in 16 per cent of cases of congenital obliteration of the ducts, operative relief is theoretically possible. As soon as the diagnosis is made an artificial passage should be made into the duodenum, or if this cannot be done, external drainage is indicated and a secondary repair made later.

Resection of the common duct. W. J. Mayo (102) says in regard to resection for strictures that usually there are many adhesions to the gastro-hepatic ligament which must be separated. The stricture is dissected out until the ends of the hepatic and common ducts lie free, when several stitches approximate the tissues behind them and the ducts themselves are united with catgut. The anterior wall of the common duct is split downward one-third of an inch to increase the size of the lumen, and it is drained with a T-tube for three weeks. Where the strictured area is in the pancreatic portion of the duct, the latter may be opened above, forceps introduced, and the stricture divulsed or in some cases it may be necessary to open the duodenum and expose the papilla. Bazy (7) reports 2 rare cases, in 1 of which hepatico-duodenostomy was performed for the obliteration of the common duct and in another choledocho-duodenostomy for obliteration of the terminal portion. Both cases recovered. Werelius (163) records a case in which during cholecystectomy by another surgeon the common duct had been severed and both ends tied. At the secondary operation the stumps were found separated one and one-half inches. He made an end-to-end anastomosis using a fine running suture of silk. The patient made a good recovery and the biliary fistula closed. Riggs (133) operated upon a case of fibrous stricture at the junction of the common, hepatic, and cystic ducts. He resected 3 cm. and made an end-to-end anastomosis after the method of Carrel for blood-vessels. The patient recovered. Phemister (122) reports a case in which during cholecystectomy the hepatic duct was ligated with the cystic artery. Complete obstruction resulted and five days later the ligature was removed. After this all the bile came through the fistula. Six weeks afterward at a third operation the hepatic duct was exposed and the ends approximated around a T-tube. The patient made an uninterrupted recovery.

Temporary cholecystostomy for gastric lesions. McArthur (104) advises temporary cholecystostomy in some cases of gastric surgery, with the object of introducing mildly alkaline salt solution or 2 per cent dextrose into the duodenum. The drop method, 5 to 10 drops per second, is used. In some cases he places the tube in the common duct instead of the gall-bladder.

Preparation for operation. Rothschild and Rosenthal (140) think in every case of cholelithiasis without jaundice a cholesterin estimate of the blood should be made. If hypercholesterinæmia exists, the drainage tube should not be removed until the blood and bile show a normal cholesterin content. Further accumulation of cholesterin should be controlled by placing the patient on a nearly fat-free diet.

Anæsthetics for gall-bladder operations. The majority of operators use ether, nitrous oxide anæsthesia, or a combination of the two. Babcock (5) uses local anæsthesia for all gall-bladder operations that are poor risks, 1 per cent novocaine for the skin and subcutaneous tissues and 0.25 per cent for muscle, fascia, and peritoneum. For patients in good condition he prefers spinal anæsthesia.

Exploratory laparotomy for gall-bladder disease. Ransohoff (127) emphasizes the point that in severe intra-abdominal infections the abdominal wall is so rigid as to preclude exact localization of the lesion. Therefore exploratory laparotomy should be done. The evidence of intra-abdominal disaster is sufficient indication for operation. Segura (147) thinks that in every case in which

icterus persists for more than two months and an exact diagnosis cannot be made, exploratory operation should be performed.

Contra-indications. This subject has been considered under previous headings. Andries (1) says the only contra-indications to early operation is some condition that would hazard the patient's life. He believes early operation would eliminate the necessity of performing cholecystectomy and thus preserve the gall-bladder for future function. An infected gall-bladder with a temperature above 102° should not be operated upon until the temperature has dropped. In greatly distended gall-bladders all that is indicated is drainage, and no attempt should be made to remove the stones with instruments at time of operation.

This review has of necessity been greatly abridged. The reader is therefore recommended to consult the original articles for more detailed information.

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ABSTRACTS OF CURRENT LITERATURE

GENERAL SURGERY—SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE

Ryan, L.: Plastic Surgery. *Illinois M. J.*, 1918, xxxiv, 64.

In the application of plastic surgery, one must consider the condition or the disease present and its eradication at the time the plastic work is attempted. This is of first consideration. Usually a defect can be repaired in tissue in one-quarter or one-third the time that the thorough painstaking removal of disease requires. Second, the removal of sufficient tissue to cover the defect is usually one-half larger than the defect. Third, due consideration must be given to the blood supply of the transplant.

The consideration of the above conditions must be carefully weighed on one side of the balance against the patient's resistance, tractability, age, etc., on the other.

The transplanted tissue, if possible, should be of the same type as that in the location to be repaired. Large pedicled flaps are of the greatest advantage. If cut the full thickness of the skin and subcutaneous tissue with at least one convex border, they can be transferred long distances and, when healing occurs, they are nearly the color of the surrounding skin. This is especially true when the flap turned or reflected contains a large blood-vessel through its center. These flaps should be allowed to become fully vascularized before the pedicle is cut. Two weeks is not too long if there is no indication for the pedicle being cut sooner.

The appearance of a line scar may be very much improved if the concave border has cut from it a V-shaped flap with the base of the "V" toward the suture line. This allows a straight flat convex and a concave surface for suturing. Otherwise there is always puckering from redundancy. Some advise, instead of one V, the removal of many V-shaped pieces. This only increases the number of scars.

EDWARD L. CORNELL.

ANÆSTHETICS

Hoag, D. E.: A Few Difficulties in the Administration of Ether. *Colorado Med.*, 1918, xv, 223.

The Committee on Anæsthesia of the American Medical Association in 1912 reported that: (1) the use of chloroform as an anæsthetic for major operations is no longer justified; (2) for minor operations its use should cease; (3) it is sometimes found convenient for initiating anæsthesia in alcoholics or other difficult subjects. The value of the first and second sweeping statements is manifest. Regarding the third, the unanimity of reports of the danger attending chloroform anæsthesia justifies the statement that chloroform should not be used to initiate other anæsthetics; a large number of deaths also occur due to delayed chloroform toxæmia.

When possible, the anæsthetist should visit the patient twenty-four hours before operation, making a careful examination and winning her confidence. This will do much toward controlling the period of excitement and lessening shock. Not much importance should be attached to the pulse-rate or to evidence of valvular disease, as cardiac muscular compensation is much more important and can easily be noted by the Stang test. This is made by asking the patient to hold her breath; if she is unable to do so for at least 20 seconds, acidosis or poor cardiac compensation may be suspected. In cases suggestive of the lymphatic stasis type, anæsthesia must be induced and maintained with great care.

In selected cases morphine and atropine given one hour before operation will aid in a smooth induction and maintenance of anæsthesia. Before operation the anæsthetist should decide the depth of anæsthesia to maintain. Patients should not be moved after the anæsthetic has been started, as quiet favors smooth induction of the anæsthetic. This is best done by giving the anæsthetic on the operating table. Short-necked persons breathe better when the head and shoulders are on a plane higher than the abdomen, provided that the head is not flexed. Patients should be strapped before starting the anæsthetic or at least at the beginning of the third stage; otherwise excitement follows. The room should be quiet; and no relatives should be admitted.

A few drops of a 25 per cent solution of oil of bitter orange in alcohol sprinkled on the mask is of benefit, especially in children. The mask should be held a few inches from the face in the beginning, and as tolerance becomes established, brought closer and kept covered with a couple of towels, leaving a small opening for dropping ether. A quiet conversation between the administrator and the patient was found of aid by the author.

Restricted or imperfect breathing may be due to nose breathing, too strong a vapor, or fear of the patient to breathe. Encouragement, reassurance and patience usually overcome this. If this breathing persists after consciousness has been abolished, rubbing the lips briskly with gauze or the finger tips or sponging out the pharynx will restore the respiratory rhythm. Those with edentulous or pendulous lips may give trouble in the second stage, the lips

being sucked in during inspiration, allowing little air or ether vapor to enter. This can be remedied by a dental prop or gag. When morphine has been given and shallow breathing occurs, the anæsthetic must not be crowded; a few drops of aromatic spirits of ammonia on the mask or lip friction often corrects this. In heavy smokers the anæsthetic vapor may excite cough, retching or vomiting. This can be helped by allowing the patient to count aloud or placing him on his side.

There are two important reasons for lessening or controlling the excitement and intoxication phenomena during incipient anæsthesia: (1) the danger of too much ether vapor inhalation; and (2) the muscular spasm which may introduce an asphyxiating factor. These can be eliminated by care and patience, although in some cases, usually in alcoholics, tobacco and drug addicts, difficulties will arise in spite of the best care. To secure complete muscular relaxation, it is best to give some preliminary narcotic and induce anæsthesia slowly and evenly; at times it is very difficult to accomplish. In these cases raising the patient's head and shoulders at one end of the table and his pelvis at the other should be tried. Late retching, coughing, and vomiting never occur during profound anæsthesia and should never be permitted to occur, swallowing being an early indication of impending vomiting, and a warning to push the anæsthetic. Hiccough is most common during intestinal manipulation and is difficult to relieve. If it occurs early, it often ceases after the skin incision.

Respiratory arrest may be mechanical from: (1) occlusion of the upper air passage; (2) substances within the upper air passage; (3) conditions directly preventing lung expansion. It may be paralytic from: (1) an overdose of anæsthetic; (2) anæmia; or (3) reflex action. The cause must be found and removed. Keeping the lower jaw pressed forward will prevent spasmodic closure of the air way, this also being accomplished by an artificial air way. The prone and semi-prone positions may embarrass respiration, and if marked, the patient should be put in the dorsal position and routine methods adopted for restoring respiration. Should acapnia ensue, rebreathing must be used. Lip friction, sponging of the pharynx, and tongue traction are of aid, and in desperate cases artificial respiration or laryngotomy must be resorted to.

To prevent circulatory failure and shock, special precautions must be adopted. Violent purgation must be avoided, the room kept warm, morphine given when indicated, the body surface and intestines exposed as little as possible, careful dissection done, delay in anæsthesia and in operation avoided, and the Trendelenburg position adopted. If the pulse fails entirely, the Lewis pendulum swing may be tried. Ether preceded by morphine and atropine is a valuable prophylactic against circulatory failure. Grave circulatory shock is almost always met with in deep anæsthesia; consequently if the operation is of such a nature that shock is likely to arise, the depth of the anæsthesia should, if possible, be lessened before the critical period.

H. H. FREILICH.

Pellot, J.: A New Method of General Anæsthesia (Nouveau mode d'anesthésie générale). *Presse méd., Par.*, 1918, xxvi, 405.

The author makes a new mixture which he calls "hypnéthyléther," composed of ethyl chloride, ether, and chloroform in the following proportions for 20 ccm.: ethyl chloride, 15 ccm; ether, 3 ccm; chloroform, 2 ccm.

He has induced more than 3,500 anæsthesias of varied lengths with this mixture in all kinds of operations. He uses a special apparatus which permits the exact dosage to be administered at the desired moment.

The author claims that anæsthesia is rapid, with a minimum of excitation; that the dosage of anæsthetic is reduced to a minimum; that postoperative complications are rarely observed; and that awakening is easy.

The construction and method of using the special apparatus are described in detail. This method of anæsthesia is contra-indicated in abdominal hysterectomies and generally in major abdominal operation lasting more than fifteen minutes.

W. A. BRENNAN.

Guisez: General Anæsthesia by Intubation (Anesthésie générale par l'intubation). *Presse méd.*, Par., 1918, xxvi, 441.

During the past two years the author has observed 330 important operations on the head, face, and neck, carried out under laryngotracheal intubation with a rubber tube. Besides the unquestionable advantages which this method gives, such as asepsis of the operating field, impossibility of aspiration of blood, and the simplification of all bloody operations in the regions referred to, there are other advantages observed, among which particularly the avoidance of postoperative chloroform vomiting is prominent. In the 330 cases the author did not observe aphonia nor other complications in the respiratory tract.

The general technique has previously been described. A sound somewhat smaller than the size of the glottis is introduced after the patient has been anæsthetized by the Ricard compress. The sound is not pushed farther than the middle of the trachea. A close tamponade insures the patient's respiring through the sound the titrated Ricard's mixture alone. The tampon is pharyngeal when the operation is on the nose, sinus or face, and inferior pharyngeal when the operation is nasopharyngeal or buccal.

Deglutition is impossible. Neither blood nor pus can fall into the respiratory passages, and danger of bronchopneumonia by deglutition is removed. Hæmorrhage is considerably reduced and asepsis is more easily realized. The technique of certain operations, such as the removal of nasopharyngeal pol-

yps, is modified, as it is not necessary to put the patient in the Rose position.

Especially noticeable is the almost complete elimination of chloroform nausea and vomiting. In only 6 of the 330 cases two or three vomitings occurred on the day of operation, and there was complete absence of nausea. In 256 other operations without intubation but in which the same chloroform mixture was used, in 10 per cent post-chloroform vomiting was observed.

In the ordinary procedure there is abundant bucco-pharyngeal secretion and the patients make numerous deglutition movements to eject saliva. In intubation not only is deglutition impossible, but the secretion is considerably reduced; and in only 10 cases was it necessary to remove mucus from the trachea during operation.

The author is of opinion that generally post-chloroform vomiting is due to deglutition of irritating substances, especially chloroform vapor. If, as in intubation, deglutition is prevented, post-anæsthetic nausea and vomiting will almost completely disappear. W. A. BRENNAN.

SURGICAL INSTRUMENTS AND APPARATUS

Pearson, M. G.: A Bed and Some Appliances for Gunshot Wounds of the Femur and Back. *Brit. M. J.*, 1918, ii, 186.

The bed is an extension of the sectional mattress idea, with this addition, that not only the mattress but the whole of that part of the bed that underlies the wound can be removed altogether, giving unimpeded access either for dressing the wound, for radiography, or for ordinary nursing purposes, so that it is unnecessary to move the patient.

It consists of an ordinary tubular frame army bedstead with the spring mattress removed and replaced by tight canvas slings, 11 inches wide, fastened by straps and buckles to one side bar of the bedstead, and by metal hooks or a quick release contrivance to the other. Upon the tight slings lie the mattresses in three or more sections. For a femur case, one square "biscuit mattress" is under the patient's head and body, another under the lower part of the legs, and a small piece of mattress lies immediately under the wound and is the one removed, with its corresponding canvas, for dressing purposes.

The bed stands 36 inches high, its head supported on a wooden trestle, the foot on a trestle or hung from the roof by chains, which can be regulated to tilt the bed. A movable arch of round iron resting on the side bars of the bed affords means for suspending the Thomas splint or the pelvis of the patient, if necessary, to expose a large part of the back or buttock at a time.

The femur apparatus is one which can be used on a patient arriving at the base hospital with the leg in a Thomas splint. Complete immobilization and extension of the thigh with greatest freedom of the ankle and knee can be attained without removing the Thomas splint. After the patient has been radiographed, Besley's or other callipers with weight and pulley extension are applied to the femur just above the knee, the points being inserted down to the bone, but not penetrating it. A subsidiary hinged splint is attached to the Thomas by a thumb-screw at the level of the knee-joint and the weight of the leg below the knee is transferred to this. The femur thus has direct and efficient extension through the callipers in its own long axis, while the leg has no extension at all, and can be flexed as much as desired. The patient's foot is suspended from a foot-piece. The leg is bare below the knee and is massaged and moved daily.

The patient, with the whole apparatus, can be carried without any difficulty. V. C. HUNT.

SURGERY OF THE HEAD AND NECK

HEAD

Pickerill, H. P.: Methods of Control of Fragments in Gunshot Wounds of the Jaws. *Lancet*, Lond., 1918, cxcv, 313.

According to Pickerill there are four factors concerned in the production of a gunshot wound of the jaws: (1) direction of the missile; (2) size of the missile; (3) muscular contraction; (4) fibrocicatricial contraction (in later stages of untreated cases). A high velocity bullet striking the bone at right angles to its surface will frequently drill it and produce radiating fractures with little or no displacement, and none in the direction of the missile. The high velocity bullet striking the bone at a tangent produces extreme comminution, and constitutes one of the most difficult forms of fracture to treat. The low velocity bullet produces a local shattering with some displacement in the direction of the missile.

In the treatment, the fragments should be reduced to normal position and a splint applied which will maintain them in that position. The author condemns the use of the four-tail bandage and of the Hammond splint. The control of the posterior fragment, either when the fracture is posterior to the last molar or when the posterior fragment is edentulous, is always a matter requiring special treatment. When it is edentulous some form of saddle can usually be fitted to a metal cap splint. When the fragment is just anterior to the masseter muscle and posterior to the last molar, the control of the posterior fragment becomes somewhat difficult. To overcome this he has devised two methods:

1. When a suitable upper molar is available, an angle band is fitted carrying an extension poste-

riorly which presses on the anterior border of the ascending ramus and so prevents it from being drawn forward and upward.

2. The zygomatic screw is the most certain method of controlling any badly displaced posterior fragment. The posterior fragment is pulled down into position forcibly, preferably by forceps introduced through the wound. An incision is made over the zygoma, a hole is drilled through the latter and the coronoid process, and a long thin screw (three-fourths of an inch) is passed through both. If the other end impinges on the skull, so much the better.

He advocates the use of the gutter splint in the control of downward displacement of upper jaw fragments.

In fractures of the neck of the condyle and coronoid process, the lower or anterior fragment must be placed in such a position as to secure good alignment and apposition. The fragments may be held in position by intermaxillary wiring, either by silver wires around the teeth; or if, as frequently happens, the upper jaw is edentulous, four holes are drilled, two in the upper and two in the lower jaw at about the level of the roots of the incisor teeth, crossed silver wires are passed through, and the mandible is thus laced up firmly to the maxilla in the desired position. The same method is applied to a fractured coronoid.

In fractures of the symphysis he uses either intermaxillary wiring or bolts the fragments together with a metal bolt passed through the lower border of the mandible posterior to the symphysis.

For the control of comminuted fragments the author has devised a splint which he calls the "screw-lever" splint. It consists of a cap fitting over the retained teeth with arms passing out of the mouth and under the mandible. To the ends of these arms is hinged a padded lever which, by being depressed by a screw anteriorly, is raised in an upward and forward direction posteriorly. In use the teeth are pressed downward into their sockets, the fragments are pressed upward, and are clamped between the cap and the pad with an increasing pressure; the teeth and fragments are both controlled and dead spaces eliminated.

In edentulous cases he applies the interdental splint method to the lower and external border of the mandible.

He concludes his paper as follows:

1. There is, or should be, no best method of controlling fragments. Each case should be treated individually, according to its requirements.

2. Control and not absolute immobilization of the fragments should be the aim of any method.

3. The utilization of function and perhaps slight mobility of the fragments from as early a time as possible is the best stimulus to union.

4. A conservative line of control should be adopted whenever possible, i. e., loose teeth and small fragments should be retained and controlled with function rather than be sacrificed to obtain an earlier but inferior result. G. W. HOCHREIN.

Gatewood, L.: Technique of Perineural Anæsthesia for Radical Surgery of the Maxillary Sinus. *Laryngoscope*, 1918, xxviii, 616.

The two nerves to be injected are the infra-orbital and the posterior superior dental. The technique for blocking these nerves is as follows: To inject the infra-orbital nerve, the infra-orbital canal is palpated with the index finger, this being located two-fifths of an inch below the middle of the infra-orbital ridge; the finger is kept on this point. With the thumb of the same hand the lip and cheek are drawn up to expose the field of operation.

The needle is inserted into the buccal fold slightly distal to the apex of the canine teeth, care being taken to avoid penetrating the alveolar process. The needle is now passed upward and slightly inward for three-fifths of an inch, infiltrating the tissues slowly as the needle is advanced. Having inserted the needle to the distance above stated, the surgeon is in the region of the infra-orbital canal of the facial surface of the maxilla. Here the remainder of the anæsthetic solution (2 ccm. of 2 per cent novocaine) is deposited, this being felt by the index finger. Gentle massage of this area will hasten the absorption of the anæsthetic, producing proper anæsthesia of this nerve and its branches.

The injection of the posterior superior dental nerve is guided by the condyle of the palate process of the maxilla. The point of insertion of the needle is in the buccal fold corresponding to the middle of the distobuccal root of the second last tooth from the condyle, this being the first or second molar respectively, depending upon the presence or absence of the wisdom tooth. The needle is now passed upward, backward, and slightly inward, passing over the apices of the buccal roots of the second or third molar, as the case may be, using an angle of about 45° to the occlusal plane of the teeth. The tissues are infiltrated slowly as the needle is pushed forward and the remainder of the anæsthetic solution (2 ccm. of 2 per cent novocaine) is deposited after the needle has disappeared for about four-fifths of an inch.

The advantages of conductive anæsthesia over the infiltration method are: (1) less anæsthetic is required; (2) anæsthesia is produced with less pain; (3) the duration of the anæsthesia is greater; (4) less trauma is produced and the danger of infection is not so great. OTTO M. ROTT.

Selfridge, G.: Plastic Surgery of the Nose and Ears. *Calif. St. J. Med.*, 1918, xvi, 416.

This paper is devoted to a discussion of five conditions which call for intranasal surgical treatment, namely, hump nose, long nose, drop nose, twisted nose, and prolapsed alar cartilage, with a brief description of the treatment of protruding ears.

In correcting hump nose, an incision is made in front of the lateral cartilage, in many instances on

both sides, and is carried to the limits of the field of the proposed operation. The skin with the periosteum is elevated from the nasomaxillary junction of one side to the corresponding point on the other side. The hump is then removed with a saw or rasp and the edges beveled so that the nose will not appear too broad on the dorsum after the hump has been removed.

Long nose is corrected by first making an incision at the mucocutaneous margin on both sides of the septum, then cutting off the end of the triangular cartilage and with it a strip of the mucous membrane; or the entire triangular cartilage may be exposed by a submucous elevation and a wedge-shaped piece of cartilage removed. Next, an incision is made anterior to the lateral cartilages and the skin and periosteum is carefully elevated over the entire nose. The incisions in the septum are then sutured and covered with a narrow strip of gauze soaked in tincture of benzoin compound.

It also seems wise to carefully mop the operated area as well as the bridge of the nose with iodine solution. No suture is necessary in the incision anterior to the lateral cartilages. Adhesive plaster is very carefully applied over the bridge of the nose from cheek to cheek and around the end of the nose, from the nasofrontal junction on both sides. No intranasal packing is necessary.

Drop nose may be due to an over-development of triangular cartilage or it may be traumatic in origin. In the former the procedure used in the correction of long nose is to be followed. In the traumatic type a pocket is dissected in the membranous septum and an inlay of bone taken from the septum or the ninth rib with a small circular saw is inserted.

In the correction of twisted nose the skin is elevated as previously described and a nasomaxillary suture line exposed. This is cut through with a saw or Lothrop slot forceps. The attachment of the nasal to the frontal bone is cut with a fine chisel or broken with a mallet. The nose is carefully strapped to hold it in position.

Prolapsed alar cartilage is a condition frequently associated with dislocated columnar cartilages and deflection of the septum. It is corrected by removing an elliptical piece of the mucous membrane, then carefully exposing the lateral cartilage and removing about one-eighth of an inch of the cartilage. Two or three silk sutures are introduced and the line of incision covered with gauze soaked in collodium or tincture of benzoin compound.

Protruding ears are corrected by cutting an ellipse of skin from the back of the ear and the neighboring mastoid with the superficial fascia, care being taken to expose the periosteum and perichondrium which are stitched together with chromic catgut. The skin is closed with silkworm gut or horsehair. Should it be necessary to remove a portion of the cartilage in the region of the antihelix, a second ellipse is cut, the cartilage exposed, and a piece most carefully dissected from the anterior skin surface.

The author emphasizes the importance of absolute asepsis in the performance of these operations. He presents case reports illustrating the different types of operation and photographs showing the condition before and after operation.

G. W. HOCHREIN.

Payne, R. L., Jr.: Cranial Decompression for Head Injuries Accompanied by Signs of Increased Intracranial Pressure. *Surg., Gynec. & Obst.*, 1918, xxvii, 345.

The author reports 29 consecutive cases of severe head injuries accompanied by marked increase in pressure in which subtemporal decompression was done in every case. Twenty-two, or 75.86 per cent, of these cases recovered, while 7, or 24.14 per cent, died. In the last 7 successive cases chosen for operation there was only one death following decompression.

Head injuries are divided into two types, mild and severe. The mild cases recover without developing high increase of intracranial pressure. It is only in the severe type of head injuries accompanied by a marked increase of pressure that decompression should be considered.

The indications for decompression in these severe head injuries depend on the signs found from study of the pulse-rate, the eye-grounds, the spinal pressure, and the systemic blood-pressure.

With reference to contra-indications for operation, the author has never seen a case of acute high intracranial pressure with a pulse of 45 to 50 recover by operation if the case was left unoperated until the pulse on the secondary rise had reached 95.

Results will be much better in these cases, if, with the proper indications present, the threatened danger to the medulla and the rest of the brain is relieved by a cranial decompression.

De Martel, I.: Cranial Surgery Under Local Anæsthesia (La chirurgie cranienne sous anesthésic locale). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1364.

In 1913 De Martel had the idea of attempting cranial operations under local anæsthesia, especially trepanations in the cerebellar area. His first attempt made in that year for a large cerebral tumor was eminently successful. Numerous similar operations were done throughout 1913 and the first part of 1914.

Since 1913 De Martel operated under local anæsthesia for 6 pontocerebellar tumors. In 2 of these cases exploration showed that the tumors were inoperable. In the 4 other cases the operation was carried out without difficulty and quite successfully, but 3 died subsequently from postoperative complications.

Since the outbreak of the war De Martel has noted that Harvey Cushing has adopted the method and has obtained all the results that the author claimed. Until recently Cushing was a firm advocate of general anæsthesia in cerebral surgery.

De Martel makes a number of subcutaneous

injections in the area to be operated upon. The fluid infiltrates between the skin and periosteum. The needle is pushed down to the periosteum at intervals of 3 or 4 cm. An absolute anæsthesia of the bone, periosteum, and even of the dura is obtained.

Local anæsthesia has the following advantages:

1. The patient can be put in a comfortable position both for himself and the surgeon.

2. The patient can change his position to facilitate the operation.

3. By permitting an elevated position of the head it diminishes the volume of the brain and the cerebellum, makes the extraction of tumors easy, and diminishes venous hæmorrhage. Ether, on the other hand, increases arterial tension. It also causes a hypersecretion of the cerebrospinal fluid and increase of intraventricular pressure.

4. Local anæsthesia eliminates vomiting and it permits the operation to be done with the greatest gentleness.

However, local anæsthesia in cerebral surgery has few advocates. It is troublesome and calls for great patience; but there is just as much difference between a trepanation done under local anæsthesia and one done under the usual methods as between a hysterectomy done in the Trendelenburg position and one done with the patient lying flat.

Discussion showed that local anæsthesia was generally used by a large number and that the results obtained were excellent. W. A. BRENNAN.

Sicard, Dambrin, and Roger: Observation at Autopsy of a Cranial Bone Plate Ten Months After Its Insertion (Contrôle autopsique d'une plastique osseuse cranienne après dix mois d'inclusion). *Bull. et mém. Soc. méd. d. hôp. de Par.*, 1918, xlii, 649.

In a soldier in whom a cranial defect had been repaired by a bone plate and who died ten months later, the authors had the opportunity of examining the changes which had taken place in the plate during the ten months of its insertion. From their examination and findings they deduce that:

1. A thoroughly sterilized bone plate is well tolerated by the tissues.

2. Its local maintenance by simple catgut sutures in the course of the operation suffices for its ultimate fixation.

3. This bone plate is rapidly overlaid on its two faces by a very resistant fibrous membrane which completely covers it, and which adheres solidly to the surrounding tissues.

4. In the absence of suppuration and under conditions of normal cicatrization without incident, the bone plate should only be attacked and absorbed after a relatively long period, since in this case ten months had elapsed and the internal face of the plate was but very slightly absorbed.

While admitting the possible absorption of dead and sterilized bone, the authors think that the fibrous sheath, already dense, firm, and hard after ten months, would later even to a greater degree offer resistance to absorption and thus be a greater protector of the plate. For all these reasons the authors think that the bone plate has all the advantages demanded in cranial plastics. W. A. BRENNAN.

Cushing, H.: Tumors of the Nervus Acusticus and the Syndrome of the Cerebellopontile Angle. Philadelphia: W. B. Saunders Company, 1917.

The studies extend over a period of ten years in Baltimore and four years in Boston, and are based on thirty cases selected from the following series. In the Baltimore collection there were 337 patients with the diagnosis of brain tumor, with 57.8 per cent of the diagnoses verified either by operation or an autopsy. In the Boston series there were 447 cases, 61 per cent of which were verified. Through secondary operation or autopsies, an additional number of cases of the series will later be verified; thus the author hopes ultimately to be able to certify the diagnosis in 74 to 80 per cent of the cases.

The 784 cases are again divided into: (1) those with verified lesions, of which there are 468; (2) those with indubitable brain tumors, the nature of the lesions remaining uncertified even though they may have been seen at operation, 257 cases; and (3) those with brain tumor syndromes, which may or may not prove to be caused by new-growths, tumor suspects, pseudo-tumor and other conditions, 59 cases.

The clinical diagnosis of an acoustic tumor can be made with reasonable assurance only when auditory manifestations definitely precede the evidence of involvement of other structures in the cerebellopontile angle.

In 25 of the 30 cases of this series, the inaugural symptoms were auditory.

A year or so after the acoustic symptoms first appear, evidence of cerebellar inco-ordination becomes apparent, and there is apt to be some soreness and stiffness in the neck on stooping and straining.

The cerebral nerves adjacent to the eighth begin to show signs of involvement in varying degree at variable periods. Next to the acoustic, the nervus trigeminus is probably the first cerebral nerve of whose involvement the patient is conscious.

Twenty of the thirty patients of the author's series gave a history of double vision, sometimes transitory and sometimes persistent. In eleven of the cases there was on admission objective weakness of the abducens on the side of the tumor. There was facial weakness in 19 of the 30 cases.

The glossopharyngeal, vagus, spinal accessory, and hypoglossal nerves do not seem to play, other than in exceptional cases, an important symptomatic rôle in these acoustic tumors. There is, however, one important group of symptoms relating to the act of swallowing and phonation which is always a warning of an advanced process and indicates special hazard in undertaking an operation. Respiratory failure, particularly during the admin-

istration of an anæsthetic, is likely to occur in patients showing these symptoms.

It is unusual for the third nerve to be affected. The author is inclined to ascribe involvement of this nerve to a kinking or vascular constriction rather than to any possibility of direct pressure. The usual symptoms of general pressure with lowering of vision are the result of choked disc and are presented by most patients at the time of admission.

Involvement of the motor and sensory pathways evidenced by a sense of numbness and twitching on the homolateral side of the body was observed in a few cases of the series.

Histologically, the tumors are composed of two types of tissue, the one of dense interlacing fibrous bands, the other of loose reticular tissue. The fibrous bands are composed of masses of elongated cells with oval nuclei. The reticular tissue, on the other hand, appears in areas of greater or less extent between these fibrous bands, and has an œdematous or hydroptic appearance, with relatively scant round cells of varying size, with sparse protoplasm lying in a loose tissue network. In this network glial or near-glial fibrils may often be detected. Hydroptic degeneration with cyst formation, however, is far less common than in many of the true gliomata of the brain itself, and the cyst content is often gelatinous and entirely unlike the straw-colored fluid of the true gliomatous cyst.

As as rule the tumors are sparsely vascularized but occasionally they may be so vascular as to give the tumor an angiomatous appearance.

The author prefers the bilateral to the unilateral or translabyrinthine operation, because it allows dislocation outward of the unaffected hemisphere during the extracerebellar exploration on the opposite side. It moreover makes it possible to diminish tension early in the course of the operation by the evacuation of cerebrospinal fluid owing to the removal of the posterior margin of the foramen magnum, and is very effective as a palliative measure in the event that the tumor cannot be removed. The technique of the operation is given in detail.

In the Baltimore series of eleven operative cases the mortality was 35.4 per cent; in the Boston series of eighteen cases it was but 11.1 per cent, and in a number of these patients more than one operation had been performed. The degree of symptomatic relief is difficult to estimate, but it is usually enormous, particularly on the side of the general pressure symptoms. The case mortality for the total series was 20.7 per cent.

The author regards a three-year period after a wide decompression and partial enucleation as a fair estimate of the expected period of relief before return of the pressure symptoms. One case of the series lived six years and seven months after a single operation.

Convalescence is usually speedy and the progress of the choking of the optic disc is halted. Most of the patients have been able to resume some work, such as household duties. C. BAGLEY, JR.

Retinger, J. M.: Serologic Localization of Organic Brain Lesions. *Arch. Int. Med.*, 1918, xxii, 234.

During the author's work on dementia præcox, the method of Abderhalden, slightly modified, proved to be of great value. The technique used in nearly all of his work was a modification of the original method based on nearly 4,000 tests; it was easy to perform, less complicated, and perfectly reliable.

A detailed description of this modification is given. The reports of twenty-five cases, studied clinically or verified by operation or necropsy, are herein considered. E. C. ROBITSHEK.

Moulonguet, A., and Legrain, P.: The Symptoms, Treatment, and Prognosis of Brain Wounds, Based on 56 Cases (Symptômes, traitement et prognostic des plaies encéphaliques d'après 56 observations). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 966.

The authors' study is confined to intradural injuries. They operated upon 54 out of 56 cases observed in their ambulance. In these 54 cases motor trouble was observed only in 10, and this more usually was hemiplegia associated with sensory disturbances. Fourteen cases showed complete coma.

Treatment is especially concerned with the value of primary closure of the skull in the case of brain injury. The authors consider this practice dangerous. A free excision of the injured tissue ought to be done here, as well as elsewhere; but the majority of authors writing on this subject have stated that large excisions of the brain tissues are not possible. The slight curettage usually practiced does not suffice to sterilize, and ignores the possible septic character of embedded projectiles. Hence primary suture is objectionable.

There is also another objection. The pulsations of the brain eliminate secretions as well as small foreign bodies when the wound is left open. This pulsation is one of the most active means of defense of the brain parenchyma. Primary closure prohibits this action.

The object of primary closure, to guarantee the area of the lesion against exogenous infection is, according to the authors, an error of interpretation. Besides, in every encephalic injury the tendency from the first is for spontaneous closure of the opening by the organization of adhesions.

The authors do not find the statistics presented by Gross and Houdart in favor of primary suture very convincing. While these statistics showed that there was a reduction from 56 to 38.7 per cent total mortality in two series of brain wounds, which reduction was attributed to early suture, yet the authors state that 61 of the second series of 124 cases were not sutured, being too extensive, and that in these very severe cases the mortality was only 44 per cent. Thus in the worst cases where suture was not possible, the mortality was only a small per cent greater than in the more favorable cases which were primarily sutured.

In their own technique the authors prefer ether or local novocaine-adrenalin anæsthesia to chloroform on account of the latter's affinity for the lipoids of the brain. They make a three-pointed star incision and carefully excise all contused tissues. Bone and fragments are extracted by forceps or a curette under control of the finger. The area is then washed with warm serum.

The authors think that the extraction of projectiles is always desirable and have found it more and more possible by working under intermittent radioscopic screen control. Extraction should be primary before infection sets in. Secondary extraction has never given other than mediocre results.

The authors do not think that the cerebral lesion ought to be drained. It is best to place a flat dressing in such a way as to preserve the statics of the brain. By the aid of superimposed compresses the meningeal breach can be kept closed and hernia prevented. Such precautions are, however, not always successful. The authors had 7 cases of meningitis and 6 cases of hernia in their 54 operated cases, 3 of the later being fatal.

Closure is generally effected in about three weeks.

The authors' actual results show that of 54 operated patients, 31 died, or 61 per cent. The survivors have been followed for periods varying from a few months to two years. In many cases, therefore, these recoveries would seem to be permanent.

Although the mortality is high, it is to be noted that 96 per cent of the cases as they came were operated upon, 9 of them being in a state of full coma from which they did not recover. If these cases of coma be subtracted, the mortality is only 49 per cent.

In cases of primary extraction of deeply embedded projectiles, the authors had 45 per cent recoveries, which proves the value of their technique.

With regard to the site of injury, wounds anterior to the auriculo-bregmatic plane had a mortality of only 35 per cent, against 67 for those behind this plane. Wounds simultaneously involving both planes have given 95 per cent mortality. Cerebellar wounds gave 100 per cent mortality.

As regards the time of operation, those operated upon within twelve hours of injury had a mortality of 20 per cent; those operated upon within thirteen to forty-eight hours, 41 per cent; and those operated upon after forty-eight hours, 87 per cent.

W. A. Brennan.

Adson, A. W.: Hypophyseal Tumors Through the Intradural Approach. *J. Am. M. Ass.*, 1918, lxxi, 721.

In two of the group of six cases, the patients presented very definite bitemporal hemianopsia, with more or less complete loss of vision in the left eye. One patient had a complete loss of vision in the right eye for a period of ten years, and a left temporal hemianopsia; one presented a typical acromegalic syndrome with a temporal color hemianopsia and constricted object field; one had bitemporal hemianopsia with more or less distorted fields in the left eye, and one had blindness in the right eye with definite neighborhood symptoms producing a frontal lobe syndrome of pressure and localization, involving the uncinate gyrus.

Postoperative convalescence was uneventful and rapid in all but one case, in which the patient died on the second day. In two cases there was complete restoration of vision, in two marked improvement in vision, and in one a relief from headache. In the case of blindness in the right eye, which was complete for ten years, the patient has begun to have a return of vision. The patient with acromegaly is having metabolic changes. In five cases there has been definite improvement. In one, no visual improvement, but relief from pain was obtained.

The particular advantages of the operation are:

1. Its approach presents a dry field, free from infection and in which it is comparatively easy to expose the optic commissure and the tumor.

2. The exposure permits the dissection of the tumor from the optic nerves and the commissure, and the removal of all or any portion of the tumor and pituitary body that is desired.

3. Trauma of the commissure and nerves is prevented, as the sponging is done against the floor of the sella instead of working upward against the commissure and nerve peduncles.

So far as the operative risk is concerned, it is no greater than in craniotomies on the frontal lobe, depending a great deal, no doubt, on the experience of the operator. Edward L. Cornell.

NECK

Boggs, R. H.: Tuberculous Adenitis and Its Treatment by Roentgenotherapy. *Am. J. Roentgenol.*, 1918, v, 425.

Boggs states that end-results in the treatment of tuberculous adenitis by roentgenotherapy are superior to those produced by any other method, because radiation is a local as well as a constitutional treatment. More cases are permanently cured by this method than by surgery alone. Roentgenotherapy never spreads the tuberculous process, leaves no deformity, and the patient always gains in weight and general health during treatment.

Surgical treatment of tuberculous glands is not justified before roentgenotherapy, nor after it, except in a small percentage of cases. There has been too great failure in the reporting of cases, and most of the failures seen by surgeons are cases in which the roentgen treatment was unfinished or inefficient. There is a small percentage of cases where it is advisable to remove fibrous nodules after radiation. These nodules are frequently mistaken for a failure in treatment, but if removed and examined, they are found to contain only the fibrous stroma of the gland.

Cervical glands occasionally undergo a calcareous degeneration following radiation that leaves the glands so dense that a roentgenogram discloses

shadows similar to those seen in the chest following nature's cure of a tuberculous process. Radiation cures the glands in the same manner as nature, and more quickly. A sclerosis of the glands, with entire obliteration of all adenoid tissue, can be produced in every case if the treatment is properly given.

Large glands, due to an inflammatory process, are frequently secondary to a septic condition elsewhere and a search should be made for the primary focus. If, after this is found and treated, the glands remain large, and particularly if they show a tendency to suppurate, roentgenotherapy should be employed at once; given promptly and properly, suppuration can nearly always be avoided. There is no better treatment than roentgenotherapy for carbuncles, boils, and other localized pus infections. There should be no haste to open a tuberculous abscess. Under roentgen treatment they are never painful.

Susceptibility to the development of tuberculosis is always greatly lessened after a few radiations and the patient in some cases at least is rendered immune.

Constitutional infection is not uncommon when tuberculous glands are neglected. Therefore a patient with chronic enlarged glands in the neck should have treatment before the constitutional symptoms develop.

By radiation the local disease can be removed and the removal of the hypersusceptibility prevents an extension of the disease. The healing of the process or local lesion is far less important than preventing the spread to a generalized tuberculosis.

D. R. BOWEN.

Darling, H. C. R.: The Surgical Importance of the Interscapular Gland. *Med. J. Australia,* 1918, ii, 45.

The author believes that an early superficial cancer of the tongue, if properly treated, should be and is curable in practically every case, although operative results have shown recurrence to be the rule at the end of three years in about 80 per cent of cases, most frequently recurring in the lymphatic tissue of the neck.

To improve these results either the public must be educated to consult a medical man early whenever a suspicious lesion occurs, or the surgeon must enlarge his knowledge of the anatomy and physiology of the lymphatic system of the neck, to enable him to treat advanced cases more efficiently.

In epithelioma of the tongue, since no surgeon is able to prove in any given case that lymphatic extension has taken a certain course toward a certain gland group and toward that group only, he believes that all operations for this condition should invariably include removal of the regional lymphatic area. The same rule should apply in the involvement of one of the glands of the lymphatic area by carcinoma, namely, removal of all groups primarily connected with the affected gland. In the early stage it can be removed with a practical certainty of cure, while deeper infection increases the difficulty of obtaining this result.

The author points out that if the involved glands remain hard and well defined, even though numerous, there is still the hopeful probability of a cure, provided a thorough operation is performed. If, however, the glands, although not necessarily large or numerous, are ill defined, giving an inflammatory rather than a carcinomatous impression, then he regards the chances of cure by operation, however large, as remote. A dozen hard, sharply defined epitheliomatous glands are less serious than a single one of which the outline is obscure. He thinks that the prognosis of buccal carcinoma, therefore, should in general be based on physical signs rather than upon the duration of the disease.

He believes that operative procedure should not be entirely a question of anatomy, but should be influenced by the clinical consideration, so that the patient may not be submitted to more serious operative treatment than is absolutely necessary.

H. J. VAN DEN BERG.

Mayo, C. H.: The Principles of Thyroid Surgery. *J. Am. M. Ass.,* 1918, lxxi, 710.

According to the author, the thyroid should be considered one of the most important glands of the body; no other gland has been so well cared for in its circulation as the thyroid, all of the blood in the body passing through it once in an hour.

The work of Plummer and Kendall, investigating the physiologic action of the thyroid secretion, is highly commended.

"Baumann in 1895 found iodine to be associated with the thyroid secretion, and Kendall in 1915 separated as a pure crystalline substance the organic compound which contains the iodine which is called thyroxin. Its function is involved in the most fundamental processes of life; that is, the production of energy. Plummer has shown that the rate at which energy is produced is controlled by the amount of thyroxin which is acting within the cells of the body. While not the only factor influencing the rate at which we live, it probably has more to do than any other substance with the governing of the speed at which energy is produced in the body. Plummer shows the average basal metabolic rate of exophthalmic goiter patients at the time of coming under observation to be 57 per cent above normal, and the average rate in those in whom ligations were done and who returned in three months, to be plus 39 per cent. The average rate eighteen days after thyroidectomy is plus 19. Ligation probably causes the metabolic rate to drop approximately 15 per cent. The basal metabolic rate of normal persons does not fluctuate more than 10 per cent above or below the normal. The total amount of thyroxin in the tissues of the body of normal persons is in all probability approximately 13 mg. Each increase of 0.033 mg. of the thyroxin in the tissues of the body increases the rate of energy output 1 per cent."

L. H. LANDRY.

Janney, N. W.: Studies in Thyroid Therapy; the Effects of the Thyroid Hormone as Determined by a Clinical Metabolic and Dietetic Investigation. *Arch. Int. Med.*, 1918, xxii, 187.

Of all attempts at organotherapy, the most brilliant results have been obtained with thyroid preparations. This fact lends especial interest to the active substance of the thyroid, as well as its employment in the treatment of disease. Some time ago a crystalline body containing over 60 per cent of iodine was prepared from the thyroid by Kendall of the Mayo Clinic. Observations made on cretins and myxœdema patients justify the view that this substance is to be regarded as a hormone having the functions ascribed to the thyroid.

The present article describes therapeutic experiments with this thyroid preparation on the effect of thyroid administration on metabolism and of diet in thyroid disease. In view of the importance of a thorough study of the thyroid hormone, it was decided to follow its action with the aid of: (1) concomitant metabolic investigations; (2) strict control of the dietary regime by specially analyzed and weighed diets; (3) prolonged periods of observation, varying from three to thirty-seven weeks; (4) parallel observations of the effect of other thyroid preparations; and (5) a series of normal control cases.

On account of the unusual amount of special food preparation, special nursing, and analytic work required, only a limited number of cases could be included. All deductions made in this article are therefore subject to this criticism. It is, however, believed that less material thoroughly studied is of greater value than a large number of cases which have been merely subjected to the usual clinical methods of control.

In order to establish a definite gauge of the activity of the thyroid preparations given, it was determined to follow the effects on the protein metabolism over continued periods, with estimation of the nitrogen intake, output, and balance. It was found that the nitrogen balance is a rather delicate measure of the action of the hormone. The results are of unusual interest, for they very definitely indicate that a gain, not a loss, of nitrogen is a result of the therapeutic action of the thyroid; and vice versa, that a loss of nitrogen, that is, protein, is due to a toxic condition of the gland.

The thyroid hormone was found to have a definite therapeutic effect in cretinism, improvement in the clinical symptoms and a gain in nitrogen retention resulting. The optimal daily dose was found to be 0.25 mg. hormone iodine, representing approximately 0.75 mg. hormone, and corresponding to four grains of thyroid tablets. It could thus be demonstrated that usually too great an amount of thyroid is prescribed in hypothyroidism. The use of the thyroid hormone in minimal doses, that is, 0.02 to 0.06 mg, hormone iodine daily in Graves' disease was followed by increased retention of nitrogen but by no certainly established therapeutic effect. The thyroid of obesity depends on a toxic effect, as it is accompanied by nitrogen loss. It should therefore be discouraged.

The effect of diet in thyroid disease was also critically reviewed and investigated. In cretinism, as in normal individuals, an evenly balanced protein, fat, and carbohydrate diet was followed by the best results. In exophthalmic goiter, as has been previously observed, very greatly increased amounts of food are necessary in order to combat the toxic combustion. A high caloric mixed diet was found to be the diet of choice in this condition. The relation of diet to the therapeutic action of thyroid preparations was also investigated.

From this and other studies of the thyroid problem, certain changes in the point of view toward thyroid function in thyroid diseases are developed and included in the general discussion. They comprise: (1) the conception of the anabolic and therapeutic action in contra-distinction to the catabolic or toxic action of the gland or its preparations; (2) a discussion of metabolism, in hypothryoidism; (3) the hormone hypothesis of the pathogenesis of exophthalmic goiter. GEORGE E. BEILBY.

SURGERY OF THE CHEST

CHEST WALL AND BREAST

Jacobson, J. H.: Cancer of the Breast. *Ohio St. M. J.*, 1918, xiv, 524.

Statistics show that the mortality from malignant disease of the breast constitutes about 10 per cent of all deaths from cancer in women. It seems certain that benign tumors and inflammations are important etiological factors in breast cancer. Radical surgical treatment gives such patients the only hope of cure. It is important to go even a step farther and remove the condition in its precancerous stage, such as benign tumors, cysts, and inflammations. The early diagnosis is therefore of supreme importance. The author believes the classification of carcinomata, brought out by Deaver, the best thus far.

This classification is: (1) scirrhous or hard cancer; (2) medullary or soft cancer; (3) carcinoma simplex; (4) adenocarcinoma; (5) gelatinous carcinoma; (6) squamous carcinoma.

From the standpoint of any early diagnosis before there is lymphatic involvement, the first two varieties are of clinical importance. The early diagnosis then rests upon the differentiation between benign tumors such as adenomata, fibromata, cysts, mastitis, and scirrhous or medullary cancer. In recent years there seems to be a diminution in

the ratio of cancer as compared with benign breast tumors. This change is explained because of the shorter duration of the disease and the fact that women seek advice earlier. There is only one way for an early diagnosis and that is removal of the tumor for macroscopic and microscopic examination. The cancer must be diagnosed before the lymphatic glands of the axilla become involved, as most patients are operated upon after the disease is too far advanced. Early removal of all suspicious tumors must be done to insure lowering the death rate from carcinoma.

In this article there is a résumé of 3,462 cases where radical operation was performed. The records show that only about one-third have been traced. Of these, 32.86 per cent were well after the three-year period, and 23.77 per cent at the five-year period. It will thus be seen that the percentage of cures is less than generally thought. Early diagnosis, early removal, and use of the X-ray postoperatively to prevent not only local but also intrathoracic recurrences are the effective means of combating breast cancer. I. W. BACH.

Tansini, I.: A Method of Amputating the Breast for Cancer (Sul mio processo di amputazione della mammella per cancro). *Riforma med.*, Napoli, 1918, xxxiv, 586.

Tansini reviews his method of amputating the breast for cancer, referring to 7 cases which have now survived six and seven years since operation. His method was first described in 1896.

When a radical amputation is done including the removal of the axillary ganglia, the gap is so great that the margins of the wound cannot be approximated. This necessitates a plastic operation which, according to Tansini, is best obtained by using the musculocutaneous dorsal strip which he proposed and used. He reviews this method and illustrates it.

The circular incision around the breast includes pectoral muscles. The excision is continued into the axillary cavity, removing the axillary glands. The dorsal incision commences at the apex of the breast incision in the axilla. This incision includes the cutting of a sufficiently large dorsal cutaneomuscular flap which, when drawn into place, will cover the gap left in the breast. Care must be observed in the dimensions of this dorsal incision so as to include a musculocutaneous dorsal strip, of sufficient length and width that it can be brought to its place so as to cover the void left after removal of the breast.

The author discusses the advantages of this plastic method. W. A. BRENNAN.

Major, R. H.: A Thymus Tumor Associated with Acute Lymphatic Leukæmia. *Bull. Johns Hopkins Hosp.*, 1918, xxix, 206.

The relationship between tumors of the thymus and leukæmia remains a subject of much interest to both clinician and pathologist. Interest in this subject is perhaps heightened by the infrequency of such cases, since, as Schridde has remarked, "With the exception of the bone-marrow, the thymus is the organ in the body poorest in tumors." Because of this comparative rarity of thymus tumors and the association of some of them with leukæmia, the author reports the following case:

A white woman, aged forty-two, entered the Kansas City General Hospital on January 17, 1918, complaining of pains in the neck. She stated that she had been weak and had had no appetite for a month. About two weeks before admission she had begun to have headaches and pains in the right thigh, radiating from the hip down to the right ankle. She had also found vision in the right eye impaired and had complained that "everything looked crossed." Some cough and shortness of breath had been present.

Physical examination showed a rather obese woman with a somewhat pasty color. The eyes reacted to light; the left pupil was slightly larger than the right. There was a complete paralysis of the sixth nerve on the right side and partial paralysis on the left side. The teeth showed a marked pyorrhœa alveolaris; the tonsils were hypertrophied. The chest showed a few moist râles in the axilla. The spleen was enlarged and palpable. Reflexes were normal. Blood-pressure was 120:185.

The spinal fluid examined on February 1 showed a cell count of 20. Nonne and Wassermann tests were negative.

A blood count on February 8 showed 3,400,000 red cells, 41,000 white cells, hæmoglobin 60 per cent. A differential count showed polymorphonuclear neutrophiles 12 per cent, small lymphocytes 35 per cent, large lymphocytes 30 per cent, transitionals 8 per cent, eosinophiles 2 per cent, myelocytes 4 per cent, degenerated forms 2 per cent, normoblasts 7 per cent.

The blood examination on February 11 showed 3,600,000 red cells, 21,000 white cells, hæmoglobin 60 per cent. A differential count showed polymorphonuclear neutrophiles 16 per cent, small lymphocytes 17 per cent, large lymphocytes 35 per cent, transitionals 9 per cent, eosinophiles 1 per cent, myelocytes 10 per cent, degenerated forms 1 per cent, normoblasts 10 per cent.

The patient died on February 12, the day following the second blood examination. The findings of the blood examination were clearly those of a lymphatic leukæmia, and the short duration of the disease with the rapid course indicated the diagnosis of acute lymphatic leukæmia.

The microscopic examination of the thymus in this case suggests very strongly a persistent thymus which has undergone a marked hyperplasia followed later by an extensive degeneration. The marked deformity of the sternum, consisting of a bowing outward with a large deep depression on the under surface corresponding to the thymus, indicates that the enlarged thymus had been present before the onset of the acute lymphatic leukæmia.

This patient with a persistent enlarged thymus

developing an acute lymphatic leukæmia recalls the views of Herz, who lays stress upon the relationship between the status thymico-lymphaticus and lymphatic leukæmia. In this case the suggestion is strong that the enlarged thymus was an indication of an abnormal lymphatic state predisposing to disease of the lymphatic apparatus which later manifested itself by the appearance of an acute lymphatic leukæmia. GEORGE E. BEILBY.

TRACHEA AND LUNGS

Thomson, St. C.: Tooth Impacted in a Secondary Bronchus of the Left Lung; Removal by Lower Bronchoscopy After Two Unsuccessful Attempts by Upper Bronchoscopy. *Practitioner*, Lond., 1918, ci, 61.

A girl aged ten years awaking from nitrous oxide anæsthesia inhaled a lower molar tooth. The child developed a wheezing respiration and cough. Rhonchi were heard on both sides, but chiefly over the left lung. X-ray examination a month after accident revealed an opacity in the region of the root of the left lung.

Bronchoscopic examination under cocaine anæsthesia revealed the tooth in an externolateral branch of the left bronchus. The tooth was tightly impacted and the smooth conoid surface toward the operator so that forceps slipped and a hook insinuated between tooth and bronchus wall itself became caught. The child showed no untoward results following this unsuccessful attempt at removal.

Eight days later a second attempt was made under chloroform anæsthesia. There was much cough and mucus and the mucosa of the bronchus was swollen, making operation more difficult than the first time. After forty minutes of anæsthesia the patient collapsed and had to be restored by artificial respiration. There was, however, no shock or fever following, but about a week later a lung abscess developed.

On the sixteenth day following the second bronchoscopy a third tracheotomic bronchoscopy was performed under chloroform anæsthesia and the tooth removed with a Killians "bean forceps." One or two tablespoonfuls of yellow pus welled into the bronchus on releasing the tooth. Complete recovery followed. C. A. HEDBLOM.

HEART AND VASCULAR SYSTEM

Perlstein, I.: Sarcoma of the Heart. *Am. J. M. Sc.*, 1918, clvi, 214.

The first authentic report of a primary tumor of the heart was by Albers in 1835. The first sarcoma was reported by Bodenheimer in 1865. Since then about 100 cases of primary tumor of the heart have been reported, but many of these reports must be rejected because the cases are not true tumors or are not primary in the heart. The most common tumors are fibromata, myxomata, fibromyxomata, and sarcomata.

A clinical diagnosis of the condition has never been made. It does not produce a characteristic picture. Some die suddenly without having shown any signs of the disease. When present, the symptoms depend upon the size and location of the tumors. The most rational diagnosis made has been " cardiac disease of unknown origin."

The author's case was that of a business man of forty-three years. There was a history of shortness of breath and cough of two weeks' duration. Physical examination showed flatness and other signs of fluid at the left base. Thoracentesis revealed bloody fluid. The heart was pushed to the right two and one half inches. The sounds were normal.

The first day at the hospital thoracentesis yielded one quart of bloody fluid. After several later aspirations at frequent intervals, a thin catheter was introduced for drainage. During his hospital sojourn the outstanding symptoms were dyspnœa, profuse perspiration, restlessness, vomiting, dizziness, faintness, weakness, thirst and cough. He died about five weeks after the first onset of symptoms.

Autopsy showed subepicardial mixed-cell sarcoma of the heart with metastasis into pericardial fat, pleura, and mediastinal lymph-glands. The primary tumor occupied the right border and the larger part of the posterior and diaphragmatic surfaces of the heart. C. A. HEDBLOM.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Egidi, G.: Penetrating Abdominal Wounds (Sulle ferite penetranti dell' addome). *Policlin.*, Roma, 1918, xxv, *sez. chir.*, 193.

The author has observed 235 abdominal war wounds treated in one of the Italian surgical ambulances. Short histories are given. There were 36.6 per cent of recoveries. In 87 non-operated patients there were 28.8 per cent recoveries, in 148 laparotomized, 41.3 per cent recoveries. Some of the non-operated cases were manifestly without gastro-intestinal intraperitoneal lesions. Subtracting these cases, 61 remain and of these only 1 recovered. Of the operated cases, 106 had perforating intraperitoneal gastro-intestinal lesions; 38 of these, or 35.8 per cent, recovered.

Multiplicity of visceral lesions aggravates the prognosis; wounds which require the sacrifice of the spleen or of a kidney are almost always fatal. If the rectal portion of the intestine is involved, the prognosis is very bad. If injuries of this class are deducted, among the remaining 76 cases operated upon the recoveries amount to 46 per cent.

The author is persuaded that intervention is necessary in all wounds with gastro-intestinal lesions except where definite contra-indications exist; but in the case of wounds of parenchymatous organs intervention is indicated only when there is considerable hæmorrhage.

As a general rule wounds through the abdomen from one side to the other or from above downward produce multiple intestinal injuries. Wounds crossing the lower pelvis are the most severe. The interval elapsing between injury and operation is very important.

The prognosis depends on a great many factors: (a) the nature of the projectile; (b) diffusion of intestinal contents intraperitoneally; (c) degree of hæmorrhage; (d) multiplicity and gravity of the lesions. There is almost always more or less diffuse peritonitis, but the cases in which there is abundant exudate, especially if rich in fibrin, are less to be feared than those in which the exudate is slight and the peritoneum looks inflamed and lacking in its normal luster.

With regard to the viscera injured and the results: in 10 injuries of the stomach, 2 recovered; in 43 injuries of the small intestine, 18 recovered; in 24 injuries of the large intestine, 9 recovered; in 29 combined injuries, 9 recovered.

The incision for the exploratory operation should be chosen so as to permit the easiest access to the viscera exposed to the path of the projectile. A median or paramedian incision, low or high according to the case, is best adapted to trajectories crossing the abdomen from front to back.

An oblique or pararectal laparotomy is best adapted to wounds of the iliac fossa and of the flanks.

It is difficult to explore the colonic flexure, especially if the laparotomy is low. A high pararectal incision seems best for this. Moreover, such an incision will permit exploration of the kidney, which will often be indicated in the course of a laparotomy.

Abdominal explorations may also be effected by the lumbar route when such a route is indicated for a frank kidney lesion.

The transpleural diaphragmatic route has been utilized when a projectile entering the thorax involves the spleen and is buried in the hypochondrium.

Exploration of the viscera in the path of the projectile should be thorough and complete. It should include exteriorization of the organs for examination. On account of the traumatizing effect this should be done part by part, one loop of intestine being explored and returned to place before a second is taken out.

In wounds of the viscera the necessity for resection is rare. In the author's 106 operated cases, only 8 resections were necessary, 7 of the small and 1 of the large intestine. These were cases of extensive multiple lesions. Intestinal suture is generally in two continuous planes, or a third may be added when the surface is covered by an omental or epiploic strip.

Intraperitoneal bladder injuries have been sutured in places. Extraperitoneal injuries have been treated by simple drainage. Liver wounds have not been operated upon unless the hæmorrhage is severe. Spleen and kidney injuries of such an extent that suture cannot repair them call for sacrifice of the organ.

Systematic peritoneal drainage has appeared to be of doubtful efficacy and it has only been done when the flow of intestinal contents was very conspicuous.

The majority of the deaths were due either to shock or to peritonitis already established at the time of operation, or to concomitant thoracic or limb wounds. In 2 cases death was due to projectiles which had escaped detection in the abdominal exploration.

The author, in discussing the indications for peritoneal exploration, points out that while in some patients the additional risk to life is small, it may be fatal in the case of those whose general conditions exclude the addition of the smallest further trauma. Such patients having already suffered much from lesions of the liver, kidneys, etc., receive from an abdominal exploration a trauma which aggravates their condition and from which they cannot hope to recover.

The author discusses many other aspects of abdominal war wounds. W. A. BRENNAN.

Huggins, R. R.: The Use of Dakin's Solution in Suppurative Conditions Within the Peritoneal Cavity. *Am. J. Obst.*, N. Y., 1918, lxxviii, 423.

The use of Dakin's solution in suppurative conditions within the peritoneal cavity was begun almost two years ago. It has been applied principally in suppurative appendicitis and in the extensive infections of tubal origin with prolonged convalescence.

There is an improvement in the general condition of the patient almost immediately; this is much more marked than in ordinary cases treated by drainage. The pain and soreness in the region of the wound quickly disappear, appetite soon returns, the color improves, and there is a rapid return of strength. For this reason, there is less danger of secondary infection. These factors alone have justified any additional trouble incident to its use.

When Dakin's solution is brought in proper contact with an infected surface, it will destroy pus; if this does not happen, it is because there is some focus not reached by the solution or because of imperfect technique. As a result of its use, there is a rapid return of strength, and the postoperative course is more comfortable, with less danger of secondary complications.

Any offensive, foul-smelling discharge is destroyed almost immediately. It is contra-indicated in the presence of an intestinal fistula. That it may delay the final healing by interfering with the normal granulating process in some instances may be true, although further observation is necessary to determine this point. EDWARD L. CORNELL.

Ide, A. W.: Local Anæsthesia in Inguinal Hernia. *J.-Lancet*, 1918, xxxviii, 534.

Every surgeon sees hernia patients who are unsafe risks for a general anæsthetic, and in these a local anæsthetic is as a rule used. In the past two years a local anæsthetic is the one of choice in an increasing number of the author's cases.

The technique used is summarized as follows: Forty-five minutes before operation a one-sixth grain of morphine is given. The preparation of the patient is the same as for a general anæsthetic except that food is not withheld. The patient is made comfortable on the operating table by means of a heavy pad and pillows. A nurse attends to his wants.

A 1 per cent solution of novocaine is used in the skin and a 0.25 per cent in the deeper tissues. Four grains of novocaine will usually suffice, but as much as twelve grains may be given with safety. No adrenalin is added because of the danger of sepsis. The tissues beneath the skin around the nerve-trunks and the sac are injected as the operation proceeds.

The sharp scalpel is preferred to blunt gauze dissection. The tissues are traumatized as little as possible, and the wounds closed in any manner desired. P. W. SWEET.

GASTRO-INTESTINAL TRACT

Andresen, A. F. R.: Syphilis of the Stomach. *N. Y. M. J.*, 1918, cviii, 544.

In the gastro-intestinal department of the Brooklyn Hospital Dispensary, the author found that out of a total of 1,000 patients suffering from all kinds of gastro-intestinal symptoms, 70, or 7 per cent, had strongly positive Wassermann reactions. A routine serological examination was done on nearly the entire 1,000 cases. Of the 70 syphilitic cases, 26, or 39 per cent, had demonstrable lesions of the gastro-intestinal tract,9 having been diagnosed as gastric ulcer, 6 having cæcal or appendiceal deformities, and the others various other lesions, such as hepatic, pancreatic, etc.

The 9 gastric ulcer cases with positive Wassermann reactions represented 15 per cent of th total number of gastric ulcer cases in the clinic, the 3 duodenal ulcers 3 per cent of all duodenal ulcers, and the 6 cæcal and appendiceal cases 5 per cent of all cases with these lesions. Five of the seventy cases had tabes dorsalis. The others apparently had merely reflex gastro-intestinal symptoms. Of the total 70 cases, the author reports but one as a definite, demonstrable case of syphilis of the stomach.

The case is one of a man, forty years old, whose radiographs showed a large, dilated stomach, with complete pyloric stenosis and the "finger-marks" appearance supposed to be characteristic of gastric carcinoma. The stools contained occult blood. The blood Wassermann reaction was four plus.

A dose of 0.6 gm. of salvarsan was given on February 23. The patient grew steadily worse, rectal feedings were not retained and with a threatening acidosis, it was deemed advisable to relieve the pyloric stenosis, which might possibly be malignant, by operation. On February 27 the abdomen was opened, and a hard, indurated mass the size of a lemon and typically malignant was found at the pylorus, adherent behind, causing a complete stenosis. A posterior suture gastro-jejunostomy was done, with the intention of doing a resection later at a secondary operation. Two weeks later, radiographs showed the stomach much smaller and the gastro-enterostomy working nicely, but the mass was apparently still present at the pylorus.

On March 22, about three weeks after the first operation and one month after the dose of salvarsan, the abdomen was again opened, but no sign of the mass was found, the pylorus being apparently free. Since that time the patient has been kept steadily under vigorous antisyphilitic treatment and has had no more gastro-jntestinal symptoms. His weight has gone from 139 pounds on discharge from the hospital after his second operation to 156 pounds at the present time. His Wassermann reaction at present is four plus. Radiographs show the gastro-enterostomy still functioning and the pylorus apparently closed. There is a defect on the upper surface of the pylorus, probably due to cicatricial contraction. EDWARD L. CORNELL.

Frank, L.: Observations on the Diagnosis and Treatment of Gastric and Duodenal Ulcers. *Am. J. Surg.*, 1918, xxxii, 224.

In the author's paper gastric and duodenal ulcers are discussed together, as from clinical, diagnostic, and therapeutic viewpoints. He thinks there seems no good reason for separate consideration. Ulcers are the most frequent gastric and duodenal lesions which the surgeon is called upon to treat.

The diagnosis of gastric and duodenal ulcer is by no means always easy of accomplishment, and errors are not impossible, even after resort to all the available laboratory methods, including roentgenographic and fluoroscopic findings.

Frank does not underestimate the importance of laboratory diagnostic aids when manipulated by competent workers, but in the hands of the inexpert he believes the findings are misleading and therefore worse than useless as a basis for therapeutic indication. He thinks the clinical history still remains the most reliable guide.

The treatment of developed gastric or duodenal ulcer is pre-eminently and distinctly surgical and is indicated as soon as the diagnosis seems assured.

As to the proper method of surgical procedure, there has been much debate, and the question has not as yet been definitely settled. It is fairly well agreed, however, that gastro-enterostomy is the simplest and safest method of surgical treatment; it affects both the drainage and chemistry of the stomach, diminishing the acidity by the presence of a small quantity of regurgitated bile and pancre-

atic excretion, relieving the pylorospasm, and allowing the stomach to empty itself without irritation of the ulcer by the passage of food. "It thus allows the ulcer to heal in over ninety per cent of cases."

Excision of the ulcer should be undertaken in the majority of instances when its location and the physical status of the patient will permit; but even under these circumstances gastro-enterostomy is usually also required to afford drainage. The fact must be remembered that the majority of so-called "pyloric" ulcers are really duodenal, and excision without gastro-enterostomy is usually unsatisfactory in its ultimate results. When the ulcer is located in the terminal two inches of the stomach, excision is probably the most appropriate method; further from the pylorus mesogastric resection may be required; but even in such cases the less radical procedure of excision and closure would seem preferable in small ulcers.

In considering the treatment of gastric and duodenal ulcers the question of possible sequelæ, such as hour-glass contracture, pyloric obstruction, hæmorrhage, perforation, malignancy, etc., must be remembered. It has been conclusively shown that in over fifty per cent of instances gastric carcinoma is engrafted upon an old ulcer base. The percentage is probably much greater than this, the evidence of pre-existing ulcer having practically disappeared when operation is undertaken for the relief of carcinoma. Early surgical treatment of the ulcer will prevent the development of carcinoma.

The observation is important that in over fifty per cent of cases of gastric malignancy the disease has progressed beyond the operable stage when the surgeon is consulted. However, even in such cases physical comfort may be increased and life prolonged by gastro-enterostomy or by jejunostomy. In early carcinoma a cure may be reasonably expected from radical surgery in a fair percentage of cases. Early diagnosis and prompt operative intervention offer the greatest prospects of permanent relief.

Frank reports in much detail five interesting cases as illustrative of the points made in his paper.

Estapé: Gastro-Enterostomy with and Without Suture (La gastroenterostomía con y sin sutura.) *Rev. de cien. méd.*, Barcelona, 1918, xliv, 164.

Estapé's report is based on 330 gastro-enterostomies, 84 of which were done using the special button devised by Jaboulay of Lyons. The author thinks this superior to the Murphy button or similar contrivances by others.

The Jaboulay button and the technique of its insertion is described and illustrated. This button fulfils all requirements. It is differentiated from others by its easy application, not necessitating a large incision; it obviates any manipulations upon the mucosa; it does not leave any foreign body interposed between the serosa of the stomach and intestines; there is uniform compression of the mucosa securing perfect hæmostasis; and there is ample communication.

The results obtained in gastro-enterostomies practiced with the Jaboulay button are considered under the headings of immediate and end-results.

Immediate results are notably better than in suture gastro-enterostomies. The patient with the button has less traumatism, the operation is shorter, and shock is insignificant. By the special disposition of the button, hæmorrhage is impossible. Since the communication between the stomach and jejunum cannot be closed, the natural flow of the gastric fluids empties the stomach and frees it from the stimuli to contractions, obviating vomiting. This freedom from vomiting is characteristic of the operation. Postoperative pain is lessened as there is but little motion of the abdominal wall.

The general recovery is very rapid because the patient is but little depressed. Food is tolerated after a few days as in suture operations, and the patient can get up after twelve or fourteen days.

The question of the durability of the newly formed pylorus is very important. Estapé's experience has confirmed his belief that the new opening is as likely to become occluded with the button operation as without it. In 84 operations using the button he has seen two cases of reduction in the orifice which necessitated re-operation, and 2 with symptoms of stricture, but in the majority of his patients, observed after a long interval, the stomach empties easily. The closure or reduction of the size of the new pylorus can be attributed to many causes depending as much upon alteration of the stomach wall and faulty diet as upon failure of the technique.

As regards mortality, in 84 operations there was but one death and this was a very poor operative risk, in which a suture operation was impossible.

Estapé considers that gastro-enterostomy with the Jaboulay button is equally as good as the suture operation as regards the end-results, and superior to it as regards the immediate or postoperative results. The button is eliminated in from fifteen to twenty days. W. A. Brennan.

Habhegger, C. J.: Intestinal Obstruction Due to a Meckel's Diverticulum. *Interst. M. J.*, 1918, xxv, 693.

The author reports a case of intestinal obstruction in a girl aged eight, who died less than twenty-three hours after the onset of pain with all the symptoms of a collapse due to intense intoxication. Postmortem examination showed strangulation of the jejunum at its junction with the duodenum and the ileum within a few feet of the cæcum by a round band about the size of a lead pencil, hollow for about an inch of its intestinal attachment, communicating with the intestine. In attempting to correlate the symptoms in this case with the postmortem findings, one is struck by their similarity to those of experimental and postoperative cases of intestinal ob-

struction of the duodenum or the first portion of the jejunum, in which death occurs rapidly, as compared with those where the obstruction is low down.

E. B. FREILICH.

Anspach, B. M.: Enterostomy and Enterocolostomy in the Treatment of Acute Intestinal Obstruction Following Pelvic Operations. *J. Am. M. Ass.*, 1918, lxxi, 785.

The measures of prevention recommended are most careful aseptic technique, avoidance of intestinal trauma, very circumspect selection and handling of drains, and avoidance of cathartics after operation until peristalsis, temperature, and pulse are normal.

It is quite likely that if every case of intestinal obstruction were immediately recognized and operated upon at once, a very large proportion of patients would recover. However, the diagnosis during the early postoperative convalescence is by no means easy, for in the incipient stage obstruction may be simulated by other comparatively harmless conditions, such as tympanites, acetonuria, exaggerated ether nausea, etc., and for this reason postoperative obstruction is frequently complicated with a spreading peritonitis and toxæmia by the time the condition is unmistakable and an operation undertaken for its relief.

Enterocolostomy has a distinct place in the therapy of acute intestinal obstruction following pelvic operations, and especially when the condition is advanced and complicated with pelvic peritonitis and toxæmia.

Five cases are reported. EDWARD L. CORNELL.

Hartmann, H., and Binet, L.: Pseudomyxoma of Appendicular Origin (Le pseudo-myxoma d'origine appendiculaire). *Ann. de gynéc. et d'obst.*, Par., 1918, lxxii, 65.

Gelatinous peritoneal tumors have been known for a very long time. Every surgeon who has a large abdominal practice has met them following the rupture of ovarian cysts. In a few of the reported cases of peritoneal pseudomyxoma following an ovarian rupture, the curious fact was noted that at the same time there existed a cystic appendicitis with gelatinous contents. The authors have operated upon such a case, which they report. They have searched the literature to find the connection between the two conditions to discover whether the appendicular tumor was secondary to the ovarian neoplasm or otherwise. They have collected 22 cases reported in the literature, to which they add 3 other cases. Short histories of all are given.

The study of the cases shows that there is almost always a perforation of the appendix. In only 2 of the cases was it specifically stated that the appendix was not perforated; but the authors think that these 2 cases had perforations secondarily obliterated.

In all cases communication between the appendix and the cæcal cavity was shut off. The orifice corresponding to Gerlach's valve had been obliterated. The gelatinous masses may be free in the peritoneum, but they are more usually encysted either in one or in a series of pockets.

The clinical history is almost always that of an appendicitis with crises. The tumor has rarely been suspected until found at operation. The authors think that it is impossible to make a clinical diagnosis of these pseudomyxomatous masses of appendicular origin.

The prognosis of peritoneal pseudomyxoma of appendicular origin is conceded by all authors to be very much better than that of peritoneal pseudomyxoma of ovarian origin. The latter gives rise to peritoneal involvement after the rupture of an ovarian cyst. The fluid emanating from the perforated cystic appendix does not contain neoplastic cells and there is only a peritoneal accumulation of mucus normally secreted by the appendix. Histologic examination made in two of the authors' cases have verified this. The only difference from the normal secretion is that the peritoneal collection is coagulated.

With regard to treatment, simple evacuation of the gelatinous mass was followed by recovery in 3 cases; in 11 cases this evacuation was coupled with removal of the appendix; there was 1 death; in 3 cases the operator believed the condition to be neoplastic and removed the encysted mass and the ileocæcal region *en bloc;* these 3 cases recovered.

The point established by the authors is that a chronic inflammatory condition of the appendix may occasion the production of gelatinous collections within the peritoneum. W. A. BRENNAN.

Evans, J. S.: Epidemiology of Acute Appendicitis in Relation to Acute Nasal and Tonsillar Infections. *Wisconsin M. J.*, 1918, xvii, 91.

This is an analysis of cases of acute appendicitis from the standpoint of etiology, occurring at the University of Wisconsin over a period of 59 months. Rosenow demonstrated the fact that the streptococcus group has an elective affinity for certain tissues. He was able to produce appendicitis in 68 per cent of animals inoculated with cultures of streptococcus isolated from cases of appendicitis, while only 5 per cent of the animals were so infected by cultures of streptococci isolated from widely varying sources. The figures dealt with below tend to prove that acute appendicitis is an acute metastatic focal infection in many instances.

From February, 1910, to June, 1916, inclusive, there were 236 cases of acute appendicitis in over 16,000 students at the University, an average of four cases per month. The analysis of these cases from the standpoint of the frequency of a primary focus of infection preceding the onset of the appendiceal symptoms is as follows: of the 236 cases; 214, or 91 per cent, were primary attacks; 22, or 9 per cent, were recurrent. Of the 214 cases, in 183, or 86 per cent, there were definite primary infections of the upper respiratory tract. There was no such evidence in 31, or 14 per cent. The respiratory

infection preceded the appendiceal attack on an average of sixteen days, the extremes being one and sixty days. The appendicitis most usually followed the subsidence of the constitutional symptoms accompanying the nasal or throat infections.

The morbidity curve of appendicitis shows that at eight periods during the six years there were marked increases above the expectant rate. Similar increases above the expectancy of acute upper respiratory infections attended these same periods, thereby making the evidence of an etiological relationship between the two diseases more definite. Briefly these periods are as follows: (1) 8 cases in 14 days; (2) 6 cases in 13 days; (3) 6 cases in 14 days; (4) 13 cases in 32 days; (5) 27 cases in 52 days; (6) 21 cases in 43 days; (7) 14 cases in 24 days; (8) 18 cases in 26 days. Here the total number of cases was 113 and the total number of days 226, or an average of one case every two days, and in all periods were associated with respiratory or tonsillar epidemics. This is in sharp contrast to the average of 4 cases per month or the expectant rate.

Of the total number of students having acute upper respiratory infections, only 1.5 per cent developed acute appendicitis, while 3 to 3.5 per cent of the students having such infections during the epidemic periods developed an acute appendicitis. The interval between the primary respiratory and the metastatic appendiceal infection was cut down from an average of 16 days to 8 days during epidemic periods. I. W. BACH.

Pauchet, V.: Aseptic Resection of the Right Colon for Constipation, Tuberculosis, or Cancer (Extirpation aseptique du colon droit pour constipation tuberculose ou cancer). *Presse méd.*, Par., 1918, xxvi, 459.

Pauchet has performed 15 total colectomies for constipation, with 1 death; and right colectomy for cancer in 9 cases, with 2 deaths; for tuberculosis in 11 cases, with no deaths.

For constipation a right hemicolectomy (the cæcum, ascending colon, and half of the transverse colon) is not so effective as a total colectomy. The operation only relieves more or less, in a proportion dependent on the condition of the other organs.

In the older total colectomy, the omentum was sacrificed. Pauchet states that the omentum must be preserved. But a total colectomy leaves irremediable and persistent abdominal disturbances, and Pauchet after ten years' experience now does a right colectomy with preservation of the whole omentum.

The operative technique of this right hemicolectomy is given in detail, with the following stages:

1. Abdominal incision, vertical, in the middle third of the median line.

2. Exploration of the right colon and abdomen for concomitant lesions, metastases, etc.

3. Colo-omental separation; section of the phrenocolic ligament; mobilization of the cæcum and ascending colon. The right half of the large and the end of the small intestine are brought into the wound. The mesentery and mesocolon of the colon and ileum segment are mobilized, sectioned, and hæmostasized. The end of the small intestine and the right half of the colon are now free.

4. Section of the right colon and anastomosis with the Murphy button. The heavy end of the button is inserted near the hepatic angle and the anastomosis is with the left transverse colon; a purse-string suture is placed on the end of the colon. If rupture of this suture or gaseous distention of the colon is feared, the colon end may be fixed in the abdominal wound and will give absolute security from infection in secondary peritonitis. A small gauze drain may be left for four days.

The foregoing technique of colectomy applies to cases of chronic constipation due to kinks, cæcal distention, etc., as well as tuberculosis and tumors of the right colon. In the case of cancer, care must be taken not to injure the duodenum nor to section the adjacent ureter.

When the Murphy button is used, it is unnecessary to consolidate it by suturing, but the anastomosis should be covered by a strip of omentum.

W. A. BRENNAN.

Desmarest, E.: Technique of Resection of the Left Angle of the Colon for Cancer (Technique de la résection de l'angle gauche du colon pour cancer). *J. de chir.*, Par., 1918, xiv, 575.

Desmarest agrees with other authors that colectomy for cancer of the left angle of the colon is not a particularly difficult operation. Undoubtedly the subthoracic position of this segment of the intestine makes it difficult to reach and liberate. By placing a block under the base of the thorax when the patient lies on the table, thus obtaining dorsal hyperextension, by making a transverse incision, and sectioning the phrenocolic ligament, resection of this colonic segment is made very easy.

The technique is divided into the following stages: (1) incision of the abdominal wall; Sprengel's transverse incision is preferred. (2) Section of the phrenocolic ligament. After wide separation of the lips of the wound the stomach must be pushed upward and intestinal loops downward and inward. The left angle of the colon is hidden by the great omentum and the phrenocolic ligament, and the latter must be sectioned high before a tumor can be reached. (3) Mobilization of the descending colon and colo-omental exposure. This is effected by incision of the parietal peritoneum at the external edge of the descending colon. (4) Isolation and extirpation of the colon. (5) End-to-end anastomosis of the two colon segments. (6) Closure.

Details of each step of the technique are given and illustrated. In all resections of the left angle it is necessary to carefully exclude the external part of the lumbar fossa from the peritoneal cavity and to drain through a posterior incision.

Desmarest thinks it possible that other surgeons may have followed this technique, but he finds no account of it in literature. W. A. BRENNAN.

LIVER, PANCREAS, AND SPLEEN

Mitchell, L. J.: The Incidence of Calculi in the Gall-Bladder as Met with in 1,600 Necropsies. *Ann. Surg.*, Phila., 1918, lxviii, 289.

The author gives a summary of necropsy statistics derived from service as coroner's physician, from individuals dying suddenly either from violence or disease.

In the 1,600 necropsies, calculi were found in 50 cadavers. In addition, on one occasion a stone was found in the common duct with the gall-bladder obliterated; and on another, one in the cystic duct. The gall-bladder was opened in every instance.

In this series there were 1,315 males and 285 females; and the number with calculi was 28 and 22 respectively. The youngest subject with calculi was twenty-five; the oldest eighty-four years.

The author quotes Mosher from a series of 1,655 necropsies; gall-stones were present in 7.85 per cent of the whites and 5.51 per cent of the negroes. Clark, from experience in the Canal Zone concludes the West Indian negro is more liable to calculi than the same race in temperate climates. In fifteen years Rodman never saw a case in Louisville, Kentucky, and only one in ten years at Philadelphia.

Hirsch asserts that biliary concretions are decidedly less common in lower than in higher latitudes. At Calcutta, Rogers believes biliary calculi are actually more common than in some European climates. Mohammedans are slightly less liable than Hindus, and Europeans considerably more so. In Egypt they are rather more common in Europeans and Turks than in natives and negroes. As regards China, while urinary calculi are excessively abundant, Jeffreys and Maxwell record but a single case (Shanghai) though they received reports from practically all parts of the country. They observe that middle China, about Canton, escaped. In 13 instances single stones were found, in 37 more than one, from 2 or 3 to 632.

In no instance was the cholelithiasis the direct cause of death. THEO. DROZDOWITZ.

Presno y Bastiony, I. A.: End-Results of Gall-Bladder Operations (Resultados lejanos de intervenciones sobre las vias biliares). *Rev. de med. y cirug.*, Habana, 1918, xxiii, 439.

The author did 67 cholecystectomies. About 18 of these patients have been followed for five years or more. In none of the patients followed have any functional disturbances been observed which could be referred to extirpation of the gall-bladder. The author, after reviewing the various theories of the function of the gall-bladder, while not recommending its systematic removal as a useless organ, thinks that it is not vitally important and that its function as a regulator of the equilibrium of pressure in the interior of the bile passages is taken up and supplied after its removal by the compensatory dilatation of the bile-ducts.

In his series of cases the author had to re-operate upon two patients for recurrence of the lithiasis. These were true recurrences and not the pseudo-recurrence of Kehr. W. A. BRENNAN.

Archibald, E.: Effect of Prolonged Bile Drainage in the Cure of Subacute and Chronic Pancreatitis. *J. Am. M. Ass.*, 1918, lxxi, 798.

While it is, perhaps, not quite justifiable to draw far-reaching conclusions on the basis of 33 cases, in view of the lack of that exact knowledge which only a second laparotomy can furnish, the author thinks, nevertheless, that the results recorded are at least suggestive.

The general fact stands out clearly that the shorter the drainage of bile, the more persistent were symptoms similar to those complained of before operation, and that when the drainage was prolonged for four weeks or more, all such patients were cured permanently. Whether or not gall-stones were present did not appear to make much difference. EDWARD L. CORNELL.

MISCELLANEOUS

Deaver, J. B.: The Traumatic Abdomen. *Ann. Surg.*, Phila., 1918, lxviii, 275.

Deaver believes that in the diagnosis of a suspected traumatic abdominal lesion, pain is of little aid. It varies in degree and there is apparently no direct relationship between its intensity and the extent of the injury. Pulse and the degree of abdominal rigidity are of importance. A man with a pulse of more than 110 is not usually able to withstand prolonged anæsthesia and requires suitable treatment before operation is undertaken. Hæmorrhage should always be suspected and then it is the state of the pulse that is often the deciding factor for or against intervention.

Abdominal rigidity varies from generalized rigidity over the entire abdomen to a small localized area. The latter often occurs in late cases where a lateral wound has involved only the colon, and a fæcal fistula or walled-off abscess has formed. The absence of rigidity is an unfavorable prognostic sign, since it is usually associated with extensive lacerating lesions of the small and sometimes the large intestine and usually is seen in cases that come under observation from ten to twelve hours after being wounded.

Vomiting, though it forms part of the history of nearly every case of abdominal injury, is not a constant feature; in fact, it is often a prominent symptom where there is no visceral lesion. The same inconstancy characterizes hæmatemesis and melæna; when present they are valuable diagnostic signs, but their absence does not necessarily indicate the absence of perforation of a viscus.

Nor is the site of the wound an unfailing indication as to the involvement of the abdominal cavity. A foreign body may enter almost any region of the body and traverse or lodge in the abdomen. The records of the present war injuries of the ab-

domen contain a surprisingly large percentage of cases in which a bullet entering the buttock has caused lesions of the cæcum or the pelvic colon, or in which involvement of the kidneys, colon, liver and spleen has resulted from a foreign body entering behind a line extending from the mid-axilla to the anterior superior spinous process of the ileum.

A valuable diagnostic point is the consideration of the entrance and the exit wounds, where both are present, and the course and direction of the track, that is to say, the plane of abdominal involvement and the structures that may have been traversed. Intestinal injury, for example, may be taken practically for granted where the track of the bullet extends anteroposteriorly in the center of the abdomen or where its course is transverse between the costal arch and the crests of the ilea. This type of injury is generally fatal, although a few exceptional recoveries have been reported. Intestinal injury likewise practically always results from contused wounds caused by localized violence, such as a sudden blow full on the abdomen, a fall from a height, or a weight falling on the abdomen.

The author believes abdominal injuries are to all intents and purposes emergency cases and there is little time for elaborate preparation before the patient reaches the operating table. The removal of the clothing, emptying of the bladder, washing the skin, preferably with a carbolic lotion or iodine, is about all that can be done in the majority of instances. Morphia and atropine are given hypodermically and if possible one hour before the anæsthetic, preferably ether, is administered. Satisfactory results have been obtained with intravenous injections of bicarbonate of soda just before the anæsthetic is given. Bicarbonate of soda not only counteracts the acidosis which is nearly always present but at the same time reduces the concentration and the viscosity of the blood.

The incision is a matter of judgment on the part of the surgeon and will also depend on the suspected viscera involved, irrespective of the site of the wound. As a safe rule, however, a median or paramedian longitudinal incision is selected. The value of X-ray demonstration of the location of the foreign body is well illustrated in those cases with only a single wound of entrance. It avoids unnecessary exploration of the entire abdomen, when a bullet has, for example, lodged in the loin, the only injury being a lesion of the colon to its peritoneal reflection, in which case the incision is made accordingly.

Opinions differ as to the value of drainage to the pelvis and the flanks. Some surgeons find nothing to recommend it, and they limit drainage to the use of a small drain carried down to the line of the sutured bowel, thus providing a local track in case of leakage. Other surgeons drain in case of profuse hæmorrhage where all oozing cannot be arrested, the best use of the tube in these instances being as a conductor for a tampon; also for possible leakage in wounds of the hollow viscera and when septic material has been extravasated, and in cases requiring temponage and temporary suture; also in stomach and colon lesions where there was much free blood in the abdomen, or, as often occurs in late cases, a free serous effusion had collected.

Lavage of the abdominal cavity is not generally advocated. Ether has been almost altogether abandoned for this purpose; satisfactory results with the use of warm serum have been reported, but saline is the medium of choice.

As to the involvement of one or the other viscus, Deaver is of the opinion that in war injuries of the abdomen the small intestine is the most frequently injured. It is the multiplicity rather than the danger of sepsis that gives these wounds their serious character. Suture is the proper method of treating them, resection being reserved for cases with numerous perforations close together.

The large intestine when wounded usually presents only a single tear or perforation rather than a complete section of the gut. The wounds of this viscus show a greater tendency to sepsis and sloughing than those of the small intestines. They are often extraperitoneal, a notable feature being the extent of bruised surface, as seen in the collection of blood between the peritoneal and external walls.

Colon wounds are characterized by their tendency to localization. Therefore if they come to operation later than twenty-four hours after injury it is advisable to enlarge the original wound with the idea that infection is localizing. If seen before that time a separate incision is the better procedure. Colotomy at the site of injury is required when the wound is extensive; otherwise suture reinforced by omental graft seems to be the chosen method. Suture combined with proximal colotomy has not found the extensive application that was expected. It proved to be superfluous, inasmuch as the tissues being already infected, its primary object of limiting infection has already been forestalled, and also the extra opening in the bowel is undesirable.

Wounds of the stomach are usually associated with injury to other abdominal viscera and often with lesions of the thorax. Peritonitis following a stomach wound usually develops slowly and runs a subacute course, except where bile has escaped from the stomach. Simultaneous perforation of the anterior and posterior wall often takes place, and as the latter is easily overlooked careful exploration of the entire stomach through the intercolo-epiploic route is most important. The author believes that suture is the preferred method of dealing with perforating gunshot wounds of the stomach. Gastroenterostomy, with or without previous suture, is resorted to only for very extensive lesions, when the antrum or the duodenum is involved, or when there is a narrowing of the stomach.

Wounds of the rectum, when extraperitoneal, are treated in the usual manner by establishing drainage after the wound has been opened up; when intraperitoneal, by suture followed in certain cases by colotomy. If possible the colotomy is made in

the transverse colon; this opening being more easily controlled and cleansed, facilitates subsequent restoration and closing of the bowel. Also in the event of secondary operation for the repair of the rectum the pelvic colon can be mobilized and brought down to the injured part.

Bladder wounds are fortunately rare, for their mortality is very high. Extraperitoneal injury, indicated usually by hæmorrhage into the bladder, may be treated by catheterization, or by perineal section; intraperitoneal injury, however, the more serious of the two, demands immediate operation.

Of the solid viscera the liver is the most frequently involved, and is at the same time the viscus which most often recovers without operation. Operation is indicated where there is evidence of profuse hæmorrhage, and generally consists of inspection, plugging, and drainage.

Wounds of the spleen *per se* usually require splenectomy. They generally occur as complications of other lesions. This is also true in the rare instances of wounds of the pancreas. The prognosis of pancreatic injury is bad, hæmorrhage is generally very severe, and treatment is mainly directed to controlling hæmorrhage by suture or gauze packing and lumbar incision.

Postoperative treatment of the traumatic abdomen does not essentially differ from the regimen in use for other abdominal operations, in Deaver's opinion. E. C. ROBITSHEK.

SURGERY OF THE EXTREMITIES

DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, CONDITIONS COMMONLY FOUND IN THE EXTREMITIES

Davidson, A. J.: A Case of Congenital Deformity of the Hands, Supernumerary Toes, and Absence of Tibiæ. *Am. J. Roentgenol.*, 1918, v, 434.

The case is reported of a male child, the sixth of seven children. His four sisters and two brothers are of normal development; and there is no family history of malformation. There are five well-formed fingers on each hand, all of about equal length, with a metacarpal bone for each. The child uses each hand well and apparently does not miss the absent thumb action. On each foot there are eight fairly well formed toes, with six equally developed metatarsals on the right side, five and a rudimentary one on the left.

The upper leg, hip, and thigh are normal. The lower legs are very short. There is complete absence of each tibia. The fibula is present but its articulation is faulty at both ends. It articulates neither with the femur nor the astragalus. On both sides there is a distal epiphysis. There is no stability to the lower legs. The child walks with difficulty by inverting the feet and bearing the weight on the outer side of the lower leg. D. R. BOWEN.

Kummer, E.: Dyschondroplasia or Ollier's Disease (La dyschondroplasie ou maladie d'Ollier). *Rev. méd. de la Suisse Rom.*, 1918, xxxviii, 569.

Cases of Ollier's disease, first described in 1899 as an affection characterized by a unilateral disturbance in skeletal growth, are rarely reported. The author describes a case in a girl whom he has had under close observation for eleven years. The details, with measurements and illustrative radiographs, are given.

The author discusses the pathogenesis with regard to the characteristic unilaterality of the phenomena, which was denied by Frangenheim. The author has observed in this case a vigorously unilateral tendency. While the cartilaginous deposits have undoubtedly participated in the general growth of the bones attacked, there is no tendency to autonomous proliferation, being thus clearly distinguished from chondromata. They lack the essential qualities of blastomata,—excessive autonomous growth. They cannot be considered otherwise than as Ollier at first described them, a progressive deformation of the primary cartilage. Instead of being replaced by bone, the primary cartilage has been the site of a disturbance of congenital origin, causing abnormal development in the extremities of the long bones, etc. W. A. BRENNAN.

Leriche, R., and Policard, A.: The Experimental Production of Bone in Adult Man Apart from Any Osteoperiostic Action (Sur la production expérimentale d'os chez l'homme adulte en dehors de toute action ostéopériostique). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1265.

The authors believe they have demonstrated that the formation of new bone does not biologically need the presence of osteoperiostic elements.

Their findings have as a basis a case in which a soldier twenty-nine years old suffered a severe thigh fracture. The projectile completely destroyed the bone, periosteum, and the medulla. After surgical cleansing and irrigation the wound progressed favorably and the muscle edges were brought together and sutured over the gaping area of fracture. The surface wound became granulated. The authors cut a sleeve made from two strips of the granulating surface tissue which they reversed and united by sutures over the muscles so that the reversed granulated surface was next the muscle surface. By the twelfth day new true bone was demonstrated to exist at the base of the granulations and the surface of the muscles. This is not in any way related to old bone. The new bone which was radiographically and histologically verified appears in a congested œdematous zone of connective tissue in which no bone was present.

The authors, therefore, think that in adult man by creating a favorable experimental condition bone can be produced without any bone being already present. This favorable condition they term an "ossifiable zone" (*milieu ossifiable*). The authors say that the deposition of bone elements in a tissue is preceded by unvarying phenomena; first, congestion of tissue of a connective nature; next, œdema; then the connective tissue is filled with a fibrinous colloidal substance, which gradually becomes transformed. That is to say, under vascular action, adult connective tissue is transformed into a tissue suitable for the reception of osteocalcareous infiltration. In connective tissue which has not undergone such changes true ossification cannot take place, and in the adult the formation of new bone requires this previous formation of an ossifiable zone. In the case reported by the authors the sleeve of granulation tissue appears to have fulfilled this rôle of an ossifiable medium; this tissue was young, very vascular, non-fibrous, and without any mechanical obstacle, consequently bone elements appeared very rapidly in it. There is no question of graft, nor of culture from old bone elements, but of a genesis of bone by precipitation of lime salts in a favorable medium.

The authors discuss the import of the phenomena from different standpoints: (1) it explains many obscure phenomena of spontaneous osteogenesis in the adult which are independent of osteoperiostic elements; (2) it explains the mechanism of certain very rapid ossifications after total bone excisions; (3) it throws light upon surgical therapeutics. As regards this latter, if by the aid of granulation tissue an ossifiable zone can be produced in which new bone appears, it is easy to conceive a number of surgical applications for this method, i. e., an aseptic cavity can thus be filled with bone. The authors have seen a bone cavity the size of a large nut filled thus with bone. This bone did not proceed from the neighboring bone but was detached from it and joined to granulating tissue introduced into the cavity. This was done thrice, each time with a complete therapeutic result.

Although the ideas now put forward appear to be in contradiction to the principles of osteoperiostic surgery, the authors believe that they can be fully reconciled. They are making further investigations and will publish a later report. W. A. Brennan.

Snyder, R. G.: A Clinical Report of Non-Specific Protein Therapy in the Treatment of Arthritis. *Arch. Int. Med.*, 1918, xxii, 224.

The reaction discussed in this report was the result of the introduction of bacterial endotoxin into the blood stream.

The author's report includes 110 patients treated during the past eleven months. The cases are grouped into: (1) acute; (2) subacute; (3) chronic.

The effects of the most important clinical phenomena which were observed in Snyder's series of cases are described in detail. The most important dangers and contra-indications which he noted in his work up to the present time are: (1) Hæmolysis may occur as the result of the intravenous use of distilled water; (2) the treatment should start by the use of a small dose, 5 to 10 millions; (3) if typhoid vaccine is used as a foreign protein therapeutic agent, it is necessary to remember that if only one dose has been given, the patient is sensitized to typhoid infection; to minimize this danger, at least two more injections should be given; (4) before using any vaccine, the previous history of any anaphylactic phenomena should be carefully inquired into.

As the result of his treatment, the author concludes as follows:

1. He has found that intravenous injections of foreign proteins are apparently more efficacious than the usual drug treatment for the relief of cases suffering from acute, subacute and chronic arthritis.

2. In some cases there is a tendency to recurrence with symptoms of a milder type. A large proportion of these patients can be greatly benefited by intensive treatment; the percentage of these recurrences is no larger than, if as large as one is accustomed to see in patients who have been treated by the drug method.

3. There is no evidence that the foreign proteins have an injurious effect upon the kidneys.

4. The treatment is not dangerous if the foregoing precautions are observed.

The vaccine prepared in the laboratories of the Board of Health, New York City, the author states gives the most reliable and uniform results.

E. C. Robitshek.

Walker, R. A.: A Series of Severe Cases of Osteomyelitis. *Practitioner*, Lond., 1918, ci, 163.

Six cases of osteomyelitis are reported as representing a series of extremely severe cases and as illustrating the fact that the patient may be in a severe septicæmic condition before the local focus manifests itself to any noticeable degree. In three of the cases recorded, the bone in which the condition later developed showed little or no signs of suppuration on the first operation. The staphylococcus aureus was present in each instance.

E. B. Freilich.

Francisco, C. B.: Foot Problems and Treatment with Unseasoned Troops. *Am. J. Orthop. Surg.*, 1918, xvi, 520.

Reviews of actual experiences with foot conditions of unseasoned troops are given and some of the measures of treatment are forcibly discussed. Most men, the author finds, were fitted with shoes that were too small, barely comfortable in civil life, but not so in military life. Muscular development was under par in many cases. Many had used the commercial arch, which causes great muscular weakness if constantly used.

Soldiers' feet grow larger because of muscular development, and so soldiers should be fitted with larger shoes than civilians to allow for shrinking of leather.

Trench foot is considered preventable. Weak feet were given the Goldthwait strap and Thomas heel. The author favors rejection of men with marked hallux valgus, hammer-toe, and rigid flat-foot. C. C. CHATTERTON.

FRACTURES AND DISLOCATIONS

Albee, F. H.: The Treatment of Fracture of the Neck of the Femur. *Am. J. Orthop. Surg.*, 1918, xvi, 493.

The author reviews the symptoms, disability, causes and classification. The attention of the medical profession is called to this fracture because of poor results of average treatment. Albee suggests the cause of this and gives the indications and outline of treatment by the bone peg method.

The symptoms, with shortening, eversion, disability, and X-ray findings are usually sufficient to maintain diagnosis. The medical profession is paying more and more attention to this fracture, because it is so often met with in industrial surgery and the present war.

It is not alone a fracture of old age. The terms intracapsular and extracapsular he considers misleading, and favors Stimson's classification of subcapital or fracture through the neck and fracture at the base of the neck. The results by old methods give only about 15 per cent good function. Whitman's abduction method gives better results than this, but it is his uniform practice to insert the bone peg in every operable case in which the fragments are loose or unimpacted, along with the Whitman method.

He believes that a traction table, Hawley or Albee, is absolutely indispensable in the operative treatment of these cases. The obstacles to union of the inner two-thirds of the neck of the femur are given as follows: (1) mechanics; (2) deficient osteogenesis; (3) intracapsular situation; (4) interposition of tissue; (5) relatively small diameter of the neck.

A great advantage is claimed by the use of a strong autogenous bone peg accurately fitted into a hole drilled longitudinally through the neck of the femur with the fragments in good position. The technique of the operation is carefully described in detail, and is well illustrated. The great advantages of the orthopedic operating table is also well described.

The long plaster-of-Paris spica cast is applied from the toes to the axilla, with the limb abducted according to the amount of shortening of the neck of the femur. This cast is usually worn six weeks; then a short spica cast is applied and worn for a period of time determined by the X-ray and other findings. No weight-bearing is allowed for at least six months. C. C. CHATTERTON.

Bec and Hedengue: A Case of Cuneiform Fracture of the Upper Extremity of the Tibia. *Paris méd.*, 1918, viii, 301.

The author quotes a case of a wounded soldier, who presented at his right knee a swelling and excoriation, and a distinct pressure point at the outer portion of the upper end of the tibia.

The X-ray revealed a fracture of the outer condyle of the tibia. The fibula was intact. In these partial fractures the fragments are, according to Tanton, usually torn from the outer condyle. The fracture fragment at the external condyle often stays in fibrous contact with the tibial epiphysis; but when the fragment becomes displaced, it usually turns backward and outward. The unicondylar fractures are of rare occurrence, only 63 cases being mentioned in literature. Bicondylar fractures are of still rarer occurrence. A. STEINDLER.

Everidge, J., and Fullerton, A.: Restoration of Function After Penetrating Gunshot Wounds of the Knee-Joint. *Brit. M. J.*, 1918, ii, 182.

The way in which the knee recovers from injuries is astonishing. The synovial membrane of a joint is now considered almost as useful as the peritoneum.

Restoration of function after civil operations on knee-joints are nearly always accompanied by a full range of mobility. Early movements should be commenced about the seventh day after operation, the movements being continued by easy steps until there is a range of at least 90 degrees. As a rule this range is obtained in seven to ten days.

The author has devised an arrangement by which movements of the knee-joint may be carried out with a minimum amount of pain to the patient and trouble to the operator. The essential parts of the apparatus are as follows:

1. A hinged Thomas knee splint. These hinges are inserted into an ordinary Thomas splint provided with extra stout side bars. A locking device on the hinges is necessary, controlled either by a bolt or a thumb screw, or by locking pins inserted through holes on large flat discs welded to the sides of the bars. This splint is slung by cords, sustaining the weight of the upper part, fixed immediately above the hinges, while the lower part is supported by cords attached to the bars about 15 inches below the hinges.

2. Two overhead rigid bars 5 feet above the bed and extending beyond the head and foot and having considerable inclination toward the foot are arranged. These bars are 12 inches apart and lie over the affected limb. They carry a system of pulleys over which run cords suspending at one end part of the splint, at the other counterbalancing sand reservoirs.

3. Sand reservoirs. There are four of these, made of conical topped oil drums. The three upper ones are fixed inverted to allow easy escape of sand. The reservoirs are arranged to counterpoise the lower and upper part of the splint by cords and pulleys. They have an up-and-down excursion according to the variation in the position of the parts of the splint they counterbalance.

About the tenth day the leg is put in the hinged splint. The amount of sand is regulated in the reservoirs so that the splint develops an angle and the knee bends. During the first two or three days the sand is allowed to run from the reservoirs very slowly and the range of movement not made greater than 45 degrees. Each day the motion is increased for a half hour after which the original position of the limb is obtained when the hinges are locked..

As a rule, at the end of a week the patient is able to begin active movements and should be encouraged. If he can be sent home with a range of active movement through a right angle and without a splint, the joint is unlikely ever to become stiff again. At this stage walking appears to be unattended by harmful results. It is of advantage to carry out massage, faradism and movements when flexion through 90 degrees has been obtained.

Willems has for some time advocated mobilization of knee-joints immediately after operation, commencing active movements from the very first; he claims an early return of full range mobility in most cases, even where there is considerable bone injury. He is not deterred from carrying out active movements even in the presence of suppuration, holding that movements express the pus from the recesses of the joint through the incisions made for drainage.

V. C. HUNT.

Brooks, J. A.: Fractures of the Astragalus. *Med. & Surg.*, 1918, ii, 530.

The author's conclusions, drawn from a review of articles published and an observation of cases are: (1) that this fracture occurs more frequently than commonly supposed; (2) that when there is no displacement of fragments, immobilization is all that is required, and the end-result is usually normal function; (3) that when there is marked separation or rotation of fragments, open operation is usually necessary for a complete reduction; (4) that an achillotomy often facilitates reduction; (5) that it is unwise to permit full weight-bearing until at least four months have elapsed, if the best functional results are to be obtained; (6) that in old fractures, with deformity, astragalectomy usually gives the best result.

E. C. ROBITSHEK.

Owen, W. B.: Observation on Fractures. *Am. J. Surg.*, 1918, xxxii, 218.

The author admits that there is as yet no consensus of opinion concerning the treatment of fractures, and in studying the apparent reasons for lack of standardization of technical methods the following clinical observations seem pertinent:

1. The infinite variety of traumatic agencies causing osseous and integumental damage.

2. The multiplicity of anatomic situations and the varieties of injury which may be produced by external violence.

3. The extreme variation in degree of the resulting bony injuries in different localities under circumstances seemingly identical.

4. The diversity in extent of the injury inflicted upon the overlying integumental, nervous, and vascular structures.

5. The physical status of the individual when first observed, and the time which may have elapsed since his injury.

6. The presence of local or constitutional disease which might militate against normal union of the injured, fractured, or lacerated tissues.

7. Finally, the type of the individual fracture and the nature and method of its production must govern the indications for therapeutic procedure.

Based upon the foregoing clinical propositions, the subject is then elaborated and discussed. Owen believes the successful treatment of fractures must necessarily be strictly individualized, and he thinks amputation should be considered only where irreparable damage has been inflicted upon osseous, integumental, nervous and vascular tissues. Exception is taken to the statement that fracture can occur from muscular contraction alone, unless the bony structures involved be already weakened by devitalizing disease, such as syphilis or tuberculosis.

Reduction with perfect maintenance of fragments and union without anatomic deformity or functional impairment will sometimes be found impossible of accomplishment by any method yet devised; and one unsatisfactory ultimate outcome will counteract the benefits derived from a thousand successful results. The individual for whom an imperfect outcome is secured is a living witness to the presumed lack of technical skill on the part of the attending surgeon; whereas those for whom perfect anatomic and functional results are obtained furnish no external visible evidence to emphasize his surgical knowledge and skill.

Since the perfection of modern instruments of diagnostic precision, including the fluoroscope and roentgen ray, the laity has been educated to demand that the surgeon secure something more than fairly satisfactory function in the treatment of fractures of every type. Anatomic deformities following the treatment of fractures have been used as the basis of more lawsuits for malpractice than all other causes combined; therefore, regardless of the apparent simplicity of the individual fracture, the surgeon should insist upon competent consultation, and further fortify himself by at least two roentgenographic plates made before and after reduction.

There remains considerable divergence of opinion concerning methods which contemplate the introduction of non-absorbable substances into the tissues for maintenance of reduction, such as plates, nails, screws, etc., which necessitate a subsequent surgical operation for their removal. Owen believes Lane plates are seldom indicated, and that in injudicious or incompetent hands their use may markedly enhance the clinical dangers. The majority of them have to be subsequently removed, and in some instances amputation has become necessary as a life-saving measure.

In oblique and comminuted fractures of long bones, open operation with application of kangaroo tendon, silver wire, or Grant's "gimlet method" may be employed to maintain the fragments in apposition. The autogenous-bone inlay will be found satisfactory in properly selected cases. However, open operation should never be performed where approximation of the fragments can be maintained by the closed method.

In the after-treatment prolonged joint fixation should be avoided. Early application of heat, gentle massage, and mild passive motion will be found beneficial; but early vigorous active movements must be practiced with caution. Persistence of pain usually indicates either improper reduction or nerve injury.

Nifong, F. G.: The Relative Values of the Principles of Extension, Suspension, and Mobility Exemplified in Both Civil and War Practice by the Hodgen Wire Cradle Extension Suspension Splint. *J. Am. M. Ass.*, 1918, lxxi, 956.

The one clear idea in treatment of fractures is to obtain fixation and immobility. In obtaining this, other principles of equal importance, such as skin, muscle, nerve, vessel, and the patient himself are frequently overlooked. In considering the proper appliances for treating fractures, several principles are involved. The first is fixation; secondly, especially in fracture of the femur, extension. An oblique fracture of the femur will produce deplorable deformity no matter how immobile the fracture is held, if extension is neglected. The application of the extension, whether it be by Buck's plaster, Steinman's pin, etc., is really made through the great fascia lata. Extension, of course, always implies counterextension.

A knowledge of mechanics, muscle attachments, and X-ray are quite essential. Suspension and mobility are important factors in fractures of the femur. This mobility of the patient is obtained by suspended splints, because the ball and socket hip-joint allows a wide range of motion without danger of moving the site of fracture. The principle of suspension is of great value in treating compound fractures and war wounds. It allows easy dressing and examinations, irrigations, etc.

An important item is flexion of a limb in a position of physiological rest. Hyperextension and hyperflexion produce pain and muscle strain, and probably a paralyzed muscle. Massage and care of the skin are very important.

After reviewing all methods and types of fixation splints, the wire cradle splint embodies more of the essential principles of treatment than any other. It can be made to fit almost any requirement. The Thomas splint is the most popular today, especially in war work. The Hodgen splint is a most perfect type of cradle splint and is especially applicable for war service. Extension and counterextension applied in any requisite amount are secured better than with any type yet devised. The inclination of the suspending cord will give any amount of extension. Counterextension is obtained by gravity, simply raising the foot of the bed sufficiently. Peroneal and ischeal pressure is avoided.

Nearly all the modifications of the Hodgen splints have marred rather than improved it, but it can be easily modified if needed. The distinctive values of the Hodgen splints are: (1) immobilization of the site of fracture; (2) it gives any amount of extension with gravity counterextension; (3) abduction and adduction are easily maintained; (4) extension is within the splints, leaving the limb free; (5) physiological flexion is secured; (6) the patient is freely movable; (7) an open wire cradle splint allows massage, inspection, etc; (8) the splint is easily modified to meet conditions; (9) a modification is devised for transport service which is not yet excelled.

J. J. KURLANDER.

SURGERY OF THE BONES, JOINTS, ETC.

DuBose, F. G.: Arthrodesis and Bone Graft in Reconstruction Surgery. *Surg., Gynec. & Obst.*, 1918, xxvii, 331.

DuBose urges surgeons in civil practice more frequently to advise operation where any cripple would be benefited.

Attention is called to the absence of quick and dramatic cures which are so attractive in other surgical endeavors, as compared with the tediousness and extent of time required before desired results and efficiency are obtained in orthopedic surgery. It was also emphasized that simplicity in armamentarium is easily obtainable by seeking the aid of mechanics and blacksmiths, and with the expenditure of some mechanical ingenuity on the part of the surgeon. A fixation frame model was exhibited, which permitted the patient to be securely immobilized at any part of the trunk, and extension and counterextension made on any of the extremities without risk of subsequent misplacement of the adjusted or apposed fractures or arthrodesed joints.

He urges the institution of operative relief before such destruction of the bony framework of joints occurs which removes material essential for good results following arthrodesis.

Attention is called to the rôle played by focal infections as an etiologic factor and as a source of complications following bone and joint surgery. Stress was laid on the preliminary preparation of the patient, eliminative, supportive, and vaccine or serum protection.

Lane's aseptic technique is commended, and its adoption urged as essential to prevent loss of life and failure in obtaining results.

The hypochlorite of soda treatment of infected wounds, especially of bones and joints, after the Carrel-Dakin method is endorsed as the quickest means of obtaining fields fit for clean operative work which were infected when presented for surgery. Murphy's formalin glycerine injection in closed septic joints for removing the infection and

preparing the joint for early operation has been repeatedly tried by him with satisfactory results.

Illustrative cases of arthrodesis of the hip, knee, and elbow ankylosis, and bone grafting in osteitis cystica fibrosa and Pott's disease are reported by him.

Cunéo, B.: The Use of Bone Grafts in the Treatment of Pseudarthroses (Sur l'emploi des greffes osseuses dans le traitement des pseudarthroses). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1129.

Although the progress of war surgery has shown a considerable decrease in the number of amputations, there has been a corresponding increase in the number of pseudarthroses. To judge by the number of such cases met with and the resulting infirmities there appears to be an opinion prevalent among many surgeons that pseudarthroses are not surgically curable. This scepticism is perhaps not without reason, considering the number of cases operated upon two, three and even more times without success.

The author has had occasion to observe a large number of pseudarthroses and has made a study of the condition both clinically and by animal experimentation.

Cunéo believes that pseudarthrosis results from atony of the bone extremities in a fracture with loss of substance. It is difficult to explain the inactivity of the bone ends, but it is probably due to vascular disturbance and injury of the nourishing arterial system.

Cunéo thinks that every pseudarthrosis not involving a large loss of substance should be considered curable. Infected pseudarthroses ought to be operated upon when the clinical and radiologic examinations show arrest of the process of repair. If fistulous, there should be a prior disinfection of the tract, operating some months later when cicatrization is complete. When the operation is deferred, the patient should be furnished with an apparatus allowing as far as possible preservation of the movements of the joints adjacent to the pseudarthrosis, as well as exercise of the muscles of the limb. The apparatus worn should be such as to favor the correction of deviation of the fragments and to prevent shortening.

For the operative treatment of pseudarthrosis Cunéo prefers bone grafts as a treatment which reawakens and permits the complete work of osteogenesis. The autogenous graft is preferred, and it may be a single graft or osteoperiostic lamellæ, both giving equally good results. Cunéo uses both but thinks it is possible to give their precise indications. The graft is indicated when it is not possible to bring the bone ends in contact, the graft then maintaining them in good position. The osteoperiostic lamellæ are used when the bone extremities can be approximated in good conditions. In employing grafts Albee's inlay method can be used with the greatest advantage, as the graft takes root quickly, holding its place even in spite of infection.

Cunéo's clinical and experimental findings lead him to think that: (1) a graft does not possess any osteogenetic power; (2) preserving the periosteum on its surface has no value; (3) vascularization is especially by the faces in contact with the bony bed; (4) from the biologic viewpoint the graft awakens the osteogenetic activity of the bone extremities. It is also a specific conductor which guides the osteogenetic action along the desired direction. It plays what Imbert has termed an osteotrophic part.

For cutting and embedding the graft Cunéo uses a specially designed instrument similar to an electrically driven dental engine. This is described and illustrated. This instrument can also be employed for osteosynthesis.

In pseudarthrosis operations the chief fear is infection. Although the wound is almost entirely sutured, in order to obviate infection the author leaves a few Dakin irrigating tubes inserted in the operated area.

The time elapsed is not yet sufficient to report definitely on the end-results of the author's cases; but the radiologic and clinical examination of these operated patients have up to the present given most satisfactory results and later Cunéo promises to submit a fully detailed report. W. A. Brennan.

Delmas, J.: Conservative Treatment of Knee Wounds (Le traitement conservateur des plaies du genou). *Rev. de chir.*, Par., 1918, liv, 49.

The author reviews the surgical treatment of war injuries of the knee, especially the evolution of the method first suggested by Delore at the end of 1915 of immediately closing the synovial, leaving a small drain or mesh, or not, according to the lesion. Late in 1916 Duval reported a number of successes following this technique. Since then the cases of success reported have multiplied, and the author now reports that out of 130 cases of knee wounds treated altogether at the front, 104 cases of penetrating wounds of the knee were treated by arthrotomy and immediate total suture. The method followed is a wide U-arthrotomy with ample section of the patellar tendon. The joint is widely opened, cleansed, washed with ether, and projectiles, if any, removed. If the tissues then look satisfactory, the synovial edges are excised, brought together, and immediately sutured without drainage.

The 130 cases of knee injuries treated by the author gave the following results: (1) 4 injuries, probably para-articular, treated by simple puncture with recovery; (2) 4 shell injuries treated by arthrotomy and drainage or flat dressing, gave 2 suppurations, 1 death by gangrene, and 1 death by tetanus; (3) 21 shell wounds, treated by primary resection, gave 4 deaths and 17 recoveries; (4) 104 penetrating wounds treated by U-arthrotomy and complete suture gave 90 recoveries with more or less complete mobility, 10 with some ankylosis, 3 amputations, and 1 death.

Comparing these results with those reported by Duval in 1916 in 58 cases of suppurative arthritis, the author's cases show, recoveries, 86.5 per cent; suppurations, 9.6 per cent; amputations, 2.8 per cent;

and deaths, 0.9 per cent. Duval's cases show deaths, 27.6 per cent; condylar resections, 21.4 per cent; total resections, 21.4 per cent; amputations, 30.8 per cent; recoveries with ankylosis, 28.8 per cent.

The author states that whatever criticism may be made with regard to the end-results of this method, it cannot be denied that it gives immediate results much superior to other methods, less mortality, fewer amputations, and greater preservation of mobility.

The author has added a note to his article stating that since a year ago when it was written, the lateral arthrotomy has been adopted by him in the simpler cases under reserve. Also the immediate mobilization method inaugurated by Willems promises even a more rapid and better recovery.

W. A. BRENNAN.

Leriche, R., and Policard, A.: Biologic Researches on Osteosynthesis with the Lambotte Plate (Recherches biologiques sur l'ostéosynthèse à la plaque de Lambotte). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1145.

From a study of 15 cases the authors find that:

1. Osteosynthesis with the Lambotte plate retards the repair of a fractured bone and hinders osteogenesis.

2. The form of the Lambotte plate is not very favorable; a narrower plate with the edges not so sharp would be better. From this point of view the Lane plates are preferable.

3. For osteosynthesis it would be advantageous to use plates which the tissues will not attack; or at least to use a metal, the products of which are not harmful, such as aluminum, magnesium, etc.

W. A. BRENNAN.

Oberembt, B. H.: Surgical Aspects of Extremities in Warfare. *Mississippi Valley M. J.*, 1918, xxv, 257.

Surgery of the extremities in war differs from traumatic surgery mostly in the severity of the injuries and the extent of the infection. The larger number of wounds are caused by high explosive shells, shrapnel, bombs and hand grenades which produce large wounds with severe laceration and great destruction of tissues.

The dominant factor in dealing with gunshot fractures of the long bones, especially those with much displacement or splintering, is extension. The extension force must be properly fixed to the distal fragment and can be accomplished by strips of adhesive plaster applied to the distal end of the fracture, supported by a circular strip and covered by a snug bandage so as to distribute the pull over the entire surface of the limb.

In cases where the distal fragment is short or close to a large joint, where a large amount of traction is necessary, where extensive abrasions are present, or in case of multiple injuries in the same limb, the Steinman nail and the Schmertz clamp were used. Straight wooden and metal splints have no place in the treatment of gunshot fractures. The Hey Grove or English splint allows the constant dressing of the infected wound without disturbing the extension or fixation. This splint is made on the order of a Hodgen's wire cradle splint, but instead of being suspended free, is fixed and the limb is extended inside the frame instead of with it.

Massage and mobilization of the joint are important. Massage should be light; the muscles should be stroked, not kneaded. Passive motion of the joints should be begun as early as the first week. Operative treatment on fractures should never be done during the suppurative stage. Dakin's solution was used with good results when associated with Carrel's technique.

In infected wounds of the hands, forearm, elbow, foot and ankle, best results were obtained with free drainage, putting the infected limb into a solution of aluminum acetate, and changing the solution every twelve hours. Numerous cases of compound fracture were exposed directly to the sun's rays for several hours daily with gratifying results.

E. B. FREILICH.

Willems, C.: Treatment of Purulent Arthritis by Simple Arthrotomy Followed by Immediate Active Mobilization (Traitement de l'arthrite purulente par l'arthrotomie simple suivie de mobilisation active immediate; technique et résultats). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1098.

Willems amplifies his previous reports regarding the utility of arthrotomy followed by immediate active mobilization of the limb, and gives his results. The reason why arthrotomy failed when used alone was because it did not drain a purulent arthritis, while resection did. But Willems considered resection too radical a procedure for the purpose of drainage alone. There was little choice, however, for if resection were not done, the chances were that an amputation might be necessary.

Immediate active mobilization, however, assured drainage. With movement of the joint, such as the knee, it could be seen that pus was readily expelled between the synovial surfaces, and the more extensive and complete the movements, the greater was the amount of pus expressed.

A vertical linear arthrotomy, usually bilateral, suffices for the knee-joint. The general rules applicable for the knee apply to the other joints also, except that their form requires some variation.

A purulent arthritis treated by arthrotomy and active mobilization evolves like an ordinary abscess. Owing to the excellent drainage, infection is confined to the synovial. It is also owing to the drainage that peri-articular abscesses, which are so frequent in purulent arthritis treated by the classic methods, are unknown with active mobilization.

Temperature is kept within low limits. The muscles of the limb are entirely or almost entirely preserved in their normal state. There is consequently a definite preservation of movements. Willems says that when the method is well applied, ankylo-

sis can always be avoided. In the great majority of cases movements are quite normal and the limb shows no functional traces of the infection.

In purulent arthritis movements are possible just the same as in non-infected articular lesions. Pain is felt only when the drainage is insufficient; it ceases when the joint is emptied of pus.

Willems has treated 20 cases of purulent arthritis among war wounds by this method, 11 of the knee, 4 of the elbow, and 5 of the tibiotarsal joint. Altogether he has obtained 13 perfect recoveries with preservation of movements, 2 recoveries with incomplete movements, 4 with ankylosis; and in 1 case resection was necessary. The 11 knee cases gave 7 perfect recoveries, 3 ankyloses, and 1 resection; the elbow cases gave 3 perfect recoveries and 1 ankylosis.

None of the imperfect results can in any way be imputed to the method adopted. Of the 13 perfect recoveries, there were only 5 cases in which there were no bone lesions. All the others had intra-articular fractures accompanying the purulent arthritis.

W. A. Brennan.

Martin, J.: Amputation of the Thigh in War Surgery (Sur l'amputation de cuisse en chirurgie de guerre). *Rev. de chir.*, Par., 1918, liv, 104.

The author has done 53 thigh amputations for war wounds. Short histories of the cases are given. In the first six months the mortality was 46.5 per cent in 28 operations; in the following twelve months the mortality was only 16 per cent in 25 operations. The figures parallel those of other operators; in the early part of the war the conditions of present-day war wounds were not so well known as now, hence surgical treatment was much less effective.

The author considers that amputation of the thigh is not a severe operation when it is done correctly and rapidly under general anæsthesia with ethyl chloride. The good appearance of the patient afterward and the actual results obtained by the author are the basis for this opinion.

The reason for the poor earlier statistics of this operation are, first, a failure of technique, the operation being long and producing shock under chloroform; secondly, a lack of clinical experience; amputations were deferred until the outbreak of infection.

The experience gained in war surgery has lessened the number of amputations by a more rational treatment of the lesion. Can a still greater improvement be looked for? It will depend on the nature of the indications calling for amputation.

Primary amputations will always have a certain degree of mortality, due to traumatic shock and not to operative shock. Their prognosis is that of shock in general, aggravated slightly by the operative shock.

The author has obtained brilliant results in cases operated upon for gaseous gangrene. In this case it is the affection calling for amputation which dominates the prognosis, and the prognosis will depend on how completely the infected area has been removed.

The author's results in septicæmias are very satisfactory, one could scarcely wish for better, except it be the entire elimination of amputations for this cause.

The author always makes circular amputations.

W. A. Brennan.

Chapple, W. A.: A Modification of the Stokes-Gritti Amputation. *Brit. M. J.*, 1918, ii, 158.

The human heel is nature's stump. Syme's amputation is the nearest reproduction, and the Stokes-Gritti comes next. Every stump should be fashioned where possible in the hope that it will bear upon its end some amount of the body weight.

One cause of failure in the Stokes-Gritti operation is the displacement of the patella upward by the pull of the quadriceps extensor; another is the presence of pegs and other means to fix the patella down in order to resist this pull.

In recent cases the author has cut the quadriceps attachment to the upper edge of the patella completely across, and then stitched the margins of the patella with catgut to the edge of the periosteum around the end of the femur. One or two additional deep catgut stitches will usually be sufficient, and a firm "button suture" through the skin will make assurance doubly sure.

V. C. Hunt.

SURGERY OF THE SPINAL COLUMN AND CORD

Cumston, C. G.: The Symptomatology and Diagnosis of Wounds of the Spine and Cord. *Albany M. Ann.*, 1918, xxxix, 277.

Cumston calls attention to the necessity of making a diagnosis of fracture of the spine, because of the frequent occurrence of medullary or radicular lesions in connection with the fracture. Medullary lesions must be studied, first, from the viewpoint of their transversal extent (hemisections and partial lesions); second, from the viewpoint of their vertical direction (systematization in the vertical direction), a most important point for the diagnosis of the seat of the missiles.

From the clinical standpoint one must distinguish two syndromes: (1) that of division, and (2) that of irritation or compression. From the pathological standpoint two cases are met with: (1) total division, and (2) partial section, each of which possesses a different clinical picture.

Total division is characterized by a limb paralysis, abolition of the muscular tonus, a quadriplegia or paraplegia, according to the location of the lesion

in the cord. Sensitive paralysis is absolute; all reflexes are absent. Bed sores develop rapidly. In total division improvement is almost out of the question. There is an aggravation of the urinary disturbances, with ascending infection of the urinary tract and the patient dies from renal infection. De Sarlo has recommended suprapubic cystotomy in order to avoid this ascending infection, but the author is not aware of the results he has obtained.

When division of the cord is partial there may be a hemiplegia of the limp variety or there may be a total or dissociated monoplegia of the same type. In cases of hemisection of the cord, the paralytic manifestations are located on the side of the lesion. The reflex disturbances in these cases follow the rule of total division, but they are unilateral and on the side of the lesion.

He calls attention to the syndrome of irritation of compression of the cord, in which the clinical picture corresponds to an irritation of the cord, its membranes or roots, the result of a missile lodged in the parts, an extradural or subdural hæmorrhage, a bone splinter or an extramedullary abscess. Four types are encountered, according to the site and extent of the compression: (1) spasmodic quadriplegia; (2) spasmodic paraplegia; (3) spasmodic diaplegia; and (4) spasmodic monoplegia. Spasmodic paraplegia is the type most commonly met with and is characterized by motor disturbances, sensory disturbances, increased reflexes, Babinski's sign, patellar and ankle clonus, retention of urine, constipation, and priapism.

In case of compression from a bone splinter radiography is the surest means of diagnosis. When there is manifestly a syndrome of irritation and when X-ray examination fails to show a foreign body in the spinal canal or fracture of the spine, hæmatorhachis should be thought of. Although the symptom is not absolute, in most cases there will be a certain interval between the receipt of the injury and the appearance of the paraplegia. Hæmatorhachis usually causes very marked compression, which is recovered from as the clot undergoes absorption. Abscesses are not common and are difficult to differentiate from hæmatorhachis. However, a tardy, slow and progressive syndrome of compression, with intermittency, a septic condition of the wound and elevation of temperature should lead the surgeon to suspect abscess formation.

G. W. Hochrein.

Luzoir, L.: Osteomyelitis of the Spine (De l'ostéomyelite vertébrale). *Presse méd., Par.*, 1918, xxvi, 378.

Vertebral osteomyelitis is a rare affection of which there is still very little known. Attention to this subject has been drawn by Eisendrath and Schram in a recent publication, which is repeatedly quoted by the author.

In 1914 Volkmann reported 84 cases of spinal osteomyelitis. Almost always some primary focus of infection, as a furuncle or some other osteomyelitic localization, is present. The dorsolumbar region is most frequently involved. The seat of the lesion may be the vertebral bodies, also the vertebral arches.

In regard to the symptoms, the beginning of the disease is usually acute, marked by severe pain in the vertebral region. The appearance of a tumor next the vertebral column usually follows quickly. The temperature is usually not very much elevated, as a rule about 100° or 101°, the pulse between 90 and 100. The abscess, if opened, reveals staphylococci in great abundance.

The author quotes one case of osteomyelitis vertebralis in a man twenty-three years old. An operation was performed two days after the onset and consisted in laminectomy and drainage of the epidural abscess, which was reached after resection of the lamina of the third and fourth lumbar vertebræ. The pus showed staphylococci.

According to Eisendrath and Schram, 68 out of 100 cases are acute, the mortality being much higher in the acute than in the subacute cases. Death in one out of two cases is due to penetration of the pus into the vertebral canal.

As a whole the prognosis is very grave, much more so in osteomyelitis of the bodies than of the lamina. The mortality, according to Volkmann, is higher in the cervical than in the dorsal cases.

In regard to the indications, incision with drainage might suffice, but a laminectomy is preferable as it insures better drainage. It is not advisable to remove the diseased bone, as this would increase the operative risk. Grisel's statistics show among 40 cases, 23 cures and 17 deaths. A. Steindler.

SURGERY OF THE NERVOUS SYSTEM

Mancini, C.: The Radical Treatment of Sciatica by Lumbar Anæsthesia (Cura radicale delle sciatiche coll' anaestesia lombare). *Riforma med.*, Napoli, 1918, xxxiv, 428.

Mancini has had some years' experience with war sciaticas. He reviews the various treatments and their results, especially the injection of anæsthetizing solutions along the nerve tract as tried by Lange, Jaboulay, and others.

Mancini proposes a method which he thinks better than existing methods: (1) to bring the anæsthetic in contact not only with the nerve roots but also with their medullary connections; (2) to act on the maximum number of nerve roots and to influence not only the sacral plexus but also the neuralgic forms in the lumbar plexus which are not usually associated with sciatica.

He uses novocaine solutions with or without the

addition of adrenalin. The injection is made in the third or fourth lumbar intervertebral space, the dose being 12 to 15 cg. of a 5 per cent novocaine solution. Anæsthesia of from three-fourths of an hour to two hours is produced. The injection may be repeated if the effect is not complete, and the author has practiced repetition after a seven-day interval, but customarily it is not necessary to repeat oftener than within the twentieth day.

The author has found the injections to give very good results in all types of pain involving the nerves or roots of the lumbosacral plexus. Where neuralgia is symptomatic, spinal anæsthesia fails.

W. A. BRENNAN.

Cone, S. M.: The Pathology of the Peripheral Nerves in Gunshot Wounds. *Am. J. Orthop. Surg.*, 1918, xvi, 509.

The paper is a brief review of material from 200 nerve injuries operated upon at Alder Hey Military Orthopedic Hospital. The injuries to the nerves were not always due to direct tears, but were often the result of direct injury to the bone and soft parts with scar formations resulting in partial or complete paralysis. Operations were not done until at least six months after the wound had healed.

Blood pigment, plasma cells proliferating connective tissue cells, especially at the severed ends, are often found in nerve coverings. Vascularity is increased.

Fibrous tissue is increased equally at the severed ends and the so-called neurofibromata is more nerve tissue than fibrous in most cases. In only one case did the author find sclerotic connective tissue. Adhesions around nerve tissue are carried, he believes, by fat. Increase of connective tissue is seen at some distance away from the point of severance.

Nerve growth was found everywhere, and the author found that nerve tissue grew even when transplanted. He found nerves in painful scars. The hardness of a nerve is due more commonly to great proliferation of a new nerve than to fibrous tissue formations. Old degenerating nerve fibers form the best conduction paths for the new tendrils. The nerves tend to follow blood-vessels and grow in thrombossed veins.

C. C. CHATTERTON.

Baron, A., and Scheiber, W.: Direct Nerve Suture in Nerve Injury. *Muenchen. med. Wchnschr.*, 1918, No. 17, April 23.

In defects of the ulnar nerve in the middle of the forearm, the resection of the sensory dorsal branch makes possible the pulling out of the peripheral nerve-end so that flexion of the wrist-joint can be better utilized in order to bridge the gap. The gain amounts to two or three centimeters and, according to the author, it saves transposition of the ulnar nerve higher up, to the front of the internal condyle.

In defects of the tibial nerve, resection of the median branch to the inner head of the gastrocnemius also liberates the nerve so that the flexors can be better utilized. The gain obtained is between five and seven centimeters.

Aside from this method of transposition of the liberated nerve, the author advocates the following method of enlongation of the nerve for the purpose of bridging the gap:

He prepares the nerve-ends free, approximates them as far as possible and then fastens the ends together by several strong silk sutures which catch the end neuroma. The prepared ends of the nerves as well as the sutures are covered with vaseline. The joint is then fixed in extreme flexion by bandages which are left on for three weeks; then the bandages are removed and the joint left free.

Three weeks later, i.e., six weeks after the first operation, mechanical treatment is begun, until gradually complete extension is obtained. Then a second operation is performed which completely unites the distal and proximal nerve-ends. The whole method rests upon the question whether or not stretching of the nerve can be obtained by this method. According to the author, the method has not yet been proven out clinically, but experimentally it was found, by working on the three large nerves of the upper extremity, that the nerve sutures held fast and that considerable lengthening of the peripheral nerve could be obtained by this method.

The author quotes one case in which this method was used. While the operation itself seemed to be carried out without technical trouble, no mention is made as to the ultimate effect of it on the paralyzed nerve.

A. STEINDLER.

MISCELLANEOUS

CLINICAL ENTITIES—TUMORS, ULCERS, ABSCESSES, ETC.

Ewing, J.: Influence of Radium on Cancer Tissues. *Am. J. Roentgenol.*, 1918, v, 413.

The author maintains that the action of radium is specific in the sense that it produces results which have not been duplicated by any other method, and produces histological changes in tumor tissue which one does not see under any other circumstances. It causes a form of liquefaction necrosis and atrophy of the tumor cells and stimulates the growth of granulation tissue. Different tumor cells react in a very different manner to radium, some, such as very cellular and rapidly growing tumors, being extremely susceptible and others very resistant. Failure to recognize these essential differences is largely responsible for the conflicting results of radium therapy. The same amount of radium applied through the same filter to the same type of cancer invariably produces the same results.

The fact that radium as employed at present has

no constitutional influence makes it far from being an ideal cancer cure. Improvements in methods of using it and greater accuracy in its application offer hopes of added usefulness. The author believes that its proper field is in the comparatively early stages of cancer and that as a remedial agent in advanced or inoperable cancer its results will never represent its greatest usefulness.

ADOLPH HARTUNG.

Descomps, P., and Clermonthe, A.: The Use of Compound Artifical Serum in the Treatment of Shock (A propos du traitement du choc; essais d'un sérum artificial complexe). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1351.

The authors treated shock in 13 patients, especially hæmorrhagic or toxic shock, by a compound artificial serum, injected intravenously.

The serum is composed of the following:

1. About 500 ccm. of Hedon's serum which is thus made up: chloride of sodium, 6 gm.; chloride of calcium, 10 cg.; chloride of potassium, 30 cg.; bicarbonate of soda, 1.5 gm.; sulphate of magnesia, 30 cg.; phosphate of soda, 50 cg.; glucose, 1 gm.; water, 1,000 gm.

2. Five ccm. of a serum containing soluble extracts of: thyroid, 50 cg.; hypophysis, 50 cg.; suprarenals, 50 cg.; testicles, 1.5 gm.; spleen, 2.5 gm.

3. Two alkaloids: sulphate of strychnine, 1 mg.; crystallized digitalin, 0.1 mg. Camphor, about 25 cg. in 500 ccm. of water, should be added as a powerful respiratory stimulant.

The object of this serum is to supply the temporary loss or diminution of the principal endocrine products in the blood of the shocked, and thus restore the conditions of circulation, as disturbances in the circulation play an important part in every kind of shock.

The technique employed for injection is that followed by Jeanbrau for blood transfusion. It occupies about ten minutes.

In the 13 cases in which this serum was injected there were 8 improvements or recoveries and 5 failures. In the 8 successful cases the pulse improved and the arterial pressure increased rapidly. At the same time polyuria was noted which was sometimes considerable; daily urea eliminations varied from 29 to 42 grams. This shows the action of the serum on the hepatic functions.

The food supply during this period was strongly hyponitrogenous. The first urine passed after injection always shows a very abundant sediment of ammonia magnesium and oxalate of chalk phosphates. In density this urine varies from 1,014 to 1,037. In 3 cases there was a heavy perspiration; excitation, delirium and psychic disturbances disappeared in 3 cases.

An animated discussion followed the authors' report, dealing principally with the different states of the phenomena comprised under the term shock, and especially the distinction between toxic shock and the nervous condition immediately following a traumatism, which Delbert terms collapse.

W. A. BRENNAN.

Morrison, J. R.: The Heart Risk in Surgical Operations. *Mississippi Valley M. J.*, 1918, xxv, 261.

If patients with serious cardiac lesions are to be operated upon, for instance, those with auricular fibrillation, auricular flutter, or heart block, operation should be done by an experienced and skillful surgeon, with a competent anæsthetist, and in the best surroundings that can possibly be obtained. The best clinical criteria for operation are: (a) the ability of the patient to walk about and attend to the ordinary duties of life; (b) his ability to ascend and descend stairs without discomfort; and (c) the absence of dyspnœa and cyanosis. Patients with diminished systolic pressure and pulse pressure after taking exercise are not good risks.

E. B. FREILICH.

Fauré-Fremiet and Pfulb: Clinical and Histological Study of the Cicatrization of Burns Under Paraffinated Dressings (Etude clinique et histologique sur la cicatrisation des brûlures sous les pausements isolants à base de paraffine). *Arch. de méd. expér.*, Par., 1918, xxviii, 15.

The authors agree with the findings of Barthe and Sandfort that paraffinated dressings of burns exactly realize the statement of Hervez de Chégoin: "When the epidermis is deficient, it must be replaced as approximately as possible by some substance which the exposed derma supports with the greatest indifference." Paraffin is endowed with remarkable chemical inertia and by its physical properties constitutes a protective covering which isolates the parts covered and fulfils the position of epidermis.

Clinically the employment of paraffin is justified by the results obtained in cases of burns in several hospitals of Paris since 1903. These results show that there has followed: suppression of pain; rapid and satisfactory progress of the wound; and a supple scar.

From the theoretical standpoint, however, the question is debatable. Every burn must be considered as an infected wound and the abundant suppuration found beneath the paraffinated dressings shows that infection persists until cicatrization. Paraffin is not an antiseptic; it cannot destroy the microbes which it covers and which are found in full vitality at all stages of cicatrizations in the purulent exudate.

The authors' study has, however, demonstrated that this fact cannot be considered an objection, for two reasons: (1) study of cicatrization has shown that it is effected just as quickly as in aseptic wounds which are kept aseptic; (2) the authors have found by histological examination that infection is confined to the surface and never penetrates to the connective tissues.

In spite of appearances, therefore, wounds submitted to paraffin dressings may be considered as aseptic and kept as such by the continuous leucocyte and lymph flow. But there is another factor to be added to these two, i. e., the considerable activity of the connective elements which form a richly vascular mesenchyma capable of reconstituting a partly destroyed derma or functionally supplying its place when entirely lost. This is the essential part of cicatrization.

Although these considerations refer only to superficial wounds due to burns, yet they apply equally to all surface wounds, however caused. One of the authors has made histologic examinations of superficial wounds similarly treated in Latarjet's ambulance service. Whether these wounds were due to a projectile or operatively caused, the histologic phenomena observed were always the same.

The article is accompanied by a number of plates illustrative of the histology. W. A. BRENNAN.

Lumière, A.: The Laws of Cicatrization of Cutaneous Wounds (Les lois de la cicatrization des plaies cutanées). *Rev. de chir.*, Par., 1918, liv, 168.

From hundreds of measurements which the author made periodically during the course of cicatrizations of wounds of the skin or of the soft parts not accompanied by osseous, vascular, or nerve lesions, and not in communication with deep suppurative areas, he has found that such lesions effectively follow constant rules in subjects from twenty to thirty years old and in good health.

These rules may be resumed as follows:

1. The rate of cicatrization of wounds kept aseptic is in general sensibly the same at the beginning as at the end of their regeneration.

2. The time necessary for the cicatrization of a wound is approximately proportional to its maximum diameter.

3. Traumatisms and contaminations of the wound retard its dermatization.

4. Frequent non-adherent dressings are preferable to infrequent dressings.

5. The use of antiseptics assures regularity in the progress of the reparative process.

6. The microbic agents utilized for the treatment of wounds have different effects on the evolution, either retarding or accelerating the repair according to their nature.

7. When well disinfected wounds are not contaminated in the course of their treatment by the aseptic method, the rate of cicatrization corresponds to an average daily reduction of their width by about 1.20 mm. to 1.30 mm.; with antiseptic treatments the diminution varies from 1 mm. to 1.72 mm. per day.

8. The experimental methods utilized permit the author to evaluate the importance of each of the numerous elements which may influence cicatrization.

These rules are an amplification of a previous report made by the author. W. A. BRENNAN.

Sellards, A. W., and Baetjer, W. A.: The Clinical Significance of the Irregular Distribution of Various Cells and Parasites in the Blood Stream and the Production of Abortive Leukæmic Changes and Splenomegaly in the Macacus Rhesus. *Bull. Johns Hopkins Hosp.*, 1918, xxix, 135.

Of the many remarkable features connected with the blood and its circulation, considerable interest is associated with the conditions governing the distribution in the circulation of the normal elements upon introduction into the blood stream. Even a cursory examination of a few details is sufficient to disclose the fact that organized cells and probably substances in solution do not circulate according to mechanical laws, but that their distribution is governed by biological conditions.

A simple illustration will make this more explicit. When a suspension of nucleated red corpuscles is injected intravenously into a rabbit, these cells disappear from the circulation within a few minutes, instead of becoming equally distributed through the blood, as in a mechanical suspension *in vitro*. In this discussion, mechanical laws are contrasted with biological conditions, but without any intention of opening the question of the explanation that is involved. Thus, it is entirely conceivable that the biological conditions may rest, in their ultimate analysis, either upon physical conditions or upon vitalistic phenomena.

There is a considerable amount of data, extending over a long period in the literature, in regard to the distribution of normal and foreign substances in the blood stream; indeed, there are many observations coming often from unexpected sources which supply information on this subject.

The authors have carried out a few simple experiments to confirm some of the essential phenomena which have been reported, and the results of such experiments may be summarized as follows:

1. The circulation of normal and foreign substances in the blood often fails to follow mechanical laws, either under normal or pathologic conditions. An unequal distribution occurs which is governed by biological conditions. The corpuscles of the blood are not distributed with mechanical uniformity throughout the blood channels; parasites invading the blood stream are often concentrated in the blood spaces of the viscera.

2. Upon injection of a variety of substances into the circulation, the injected substances and the leucocytes, especially the polymorphonuclears, disappear from the peripheral circulation within a few minutes and collect in the blood-vessels of the viscera, principally in the lungs and liver. Within a short time the leucocytes return to the peripheral circulation, often in increased numbers and sometimes after having phagocyted the injected material.

3. The leucocyte count cannot be interpreted as an index of absolute change in number of leucocytes in the entire body, for it often indicates only changes in distribution rather than a formation or destruc-

tion of white cells. Thus, the total white count does not constitute crucial evidence that there is an absolute leucopænia in typhoid fever. There are at least three factors governing the leucocyte count: (a) the infecting organism; (b) the severity of the infection; and (c) the location of the infection in the host.

4. The failure of foreign substances to be distributed in the blood stream according to mechanical laws has an importance bearing on the transmission of infectious diseases. It offers many arguments against intravenous injections of infective material for the transmission of a disease to resistant animals for the reason that: (a) considerable dilution of the material necessarily occurs; (b) extensive opportunity is offered for the action of any deleterious effects which the fluids and cells of the blood may exert; (c) fine suspensions and limited amounts of material are necessary in order to avoid embolism and sudden death; (d) finely suspended matter is not distributed equally throughout the blood stream, but a large proportion is removed by the lungs. Many of these objections could, of course, be overcome by an intra-arterial injection if it were made into the proper side of the circulation.

5. Inoculation into the spleen for the transmission of splenomegalies to lower animals possesses certain advantages: (a) it avoids many of the disadvantages of intravenous injection; (b) the injected material can be temporarily protected from the immediate action of the fluids and cells of the body; (c) the mechanical advantage is considerable since large pieces of material can be used; (d) the spleen is well adapted for study, since changes in its size in certain animals can be readily determined by palpation. GEORGE E. BEILBY.

SERA, VACCINES, AND FERMENTS

Rouvillois, Guillaume-Louis, Pédeprade and Thibierge: Treatment of Gaseous Gangrene by Antigangrenous Sera (Traitement de la gangrène gazeuse par l'emploi des serums antigangreneux; méthode de Sacquépée). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1226.

Since August, 1917, the authors have tried the effects of combined antivibrion septique and antibellonensis sera in treating gaseous gangrene cases as a complement of surgical treatment. The method is based on the fact that Sacquépée considered it established that the septic vibrion and the bacillus bellonensis were the pathogenic agents concerned in primary gaseous gangrene.

The method has been employed from a curative and also from a preventive viewpoint and in true gaseous gangrene cases, as distinct from simple gaseous abscesses.

In 12 cases of manifest gas gangrene treated by surgery alone without serotherapy, there was only 1 recovery. The 11 others died within forty-eight hours.

There were 34 cases of true gaseous gangrene in which the local symptoms were accompanied by severe general symptoms, treated by serotherapy combined with surgery; 21 of these cases arrived with the gangrene in full evolution; in the 13 others the symptoms did not become fully manifested until at least a day later. All were limb wounds, 18 cases being multiple injuries, and 31 cases involving the lower limb, 9 of which were accompanied by vascular lesions.

The time of application of the method is divisible into two periods. In the first the procedures were experimental and the details not fully worked out. In the second period only those procedures which gave known good results were employed. In 6 cases treated during the first period it was established that the two sera were quite inoffensive and that the dosage used (20 ccm. not repeated) sufficed for amelioration or recovery. During the second period higher and repeated doses were used. Twenty-five cases were thus treated; 5 of these died ultimately of other causes but were completely cured of the gaseous gangrene. Of the 20 others, 14 recovered and 6 died. Short histories of the 14 recovered cases are given. Generally a notable improvement was observed from the second or third day and the recovery was rapid. Seven of the cases underwent subsequent amputation and 7 recovered without amputation. Of the 6 deaths, 3 arrived in a dying condition and died a few hours after injection, the serum not having had time to act. The 3 others in good condition died after fourteen, twenty-four, and seventy-two hours respectively.

As a preventive measure serum is only injected by the authors in those cases in which a gaseous gangrene is likely to occur. In 12 such cases where there was no massive mortification of the tissues, there was only 1 failure and this yielded to further treatment. In 6 cases with massive mortification, all recovered without the development of gaseous gangrene.

The technique followed by the authors is to practice the surgical treatment called for exactly as if there was no question of serotherapy. The sera employed are the antivibrion septique serum prepared in the Pasteur Institute and the antibellonensis serum prepared in the laboratory of the Fourth Army. In the usual gaseous forms of gangrene when manifest for the first injection the authors use: antivibrion septique serum, 40 ccm., antibellonenis serum, 40 to 60 ccm.

The intravenous route is preferred. After six hours the same dose is injected subcutaneously; 18 to 21 hours after the second injection a similar dose is repeated subcutaneously. The second and third doses may be delayed if the clinical circumstances require it. As long as the toxic infection exists, from 20 to 40 ccm. of each serum should be injected daily; but when amelioration is observed, the daily doses may be rapidly decreased.

In the œdematous forms of gangrene the dosage is 60 ccm. of antibellonensis and 20 ccm. of antivibrion serum intravenously repeated as above.

In the preventive treatment the dosage is 20 ccm.

of each serum, repeated at least once if there is no massive mortification. When there is massive mortification, the dosage is 40 ccm. of each serum repeated every eight to twelve hours.

With regard to anaphylactic accidents, these patients have as a general rule already received antitetanic serum and are not exposed to anaphylaxis. But if not, it is well to inject previously to the regular injection a weak dose of vaccine. W. A. BRENNAN.

BLOOD

McJunkin, F. A., and Charlton, A.: The Practical Identification of Endothelial Leucocytes in Differential Counting. *Arch. Int. Med.*, 1918, xxii, 157.

A method for the identification of endothelial leucocytes in the peripheral blood has been reported. This method, as was pointed out in its description, is not well adopted to routine work on account of the impossibility of bringing all cells into contact with the carbon particles of the suspension employed to determine the phagocytic properties of the leucocytes. The purpose of this paper is to record the application to blood films of an indophenol staining reaction which brings out characteristic cytoplasmic granules in the endothelial leucocytes.

To apply the stain, a blood film made in the usual way on a 22 mm. square cover-glass is covered for half a minute with 5 drops of an alphanaphthol-methyl-violet solution in order to fix the preparation. The alcoholic stain is then diluted with an equal amount of distilled water, and the dilute stain allowed to act for five minutes. The preparation is washed with water, dried with filter paper counterstained for two or three minutes with 0.01 per cent basic fuchsin, (Grubler) washed, dried in the air, and mounted in balsam.

To prepare the alphanaphthol-methyl-violet solution, add 0.2 gm. alphanaphthol (Merck .reagent), 0.015 gm. methyl-violet, 5 B. (Grubler), and 0.2 ccm. hydrogen peroxide to 100 ccm. of warm 80 per cent alcohol (made from absolute alcohol). The hydrogen peroxide used should contain approximately 3 per cent by weight of the gas as determined by titration with decinormal potassium permanganate.

Reaction of the blood cells to the stain is as follows: Nuclei and cytoplasm are colored red, except the cytoplasmic granules in neutrophiles, eosinophiles, and endothelial leucocytes, which are blue. The granules of basophiles are of a distinctive red color. The granules of the eosinophiles are large and the central portion appears unstained, so that these granules have a very characteristic ringlike appearance not seen in the granules of other leucocytes. The platelets take the red stain faintly; the erythrocytes are pink.

In 34 differential counts made on the blood of normal adults, the average percentage of endothelial leucocytes was found to be 5 per cent; an average of these leucocytes on the 17 counts made on the four cases of syphilis receiving arsphenamin is 5.3 per cent. The percentages are based on counts of from 1,000 to 2,000 leucocytes. It would seem, therefore, that increases in this variety of cell are not produced by intravenous injection of arsphenamin.

The following conclusions seem to embody the authors' ideas with reference to this subject. The endothelial leucocytes of the peripheral blood can be stained differentially. That the stain is specific is shown by staining blood in which this variety of leucocyte is characterized by ingested carbon.

GEORGE E. BEILBY.

Wurtz, J. G., and Sappington, S. W.: A Simple Method for Blood Cultures. *J. Med. Research*, 1918, xxxviii, 371.

There is nothing more diagnostically satisfactory in clinical or laboratory work than a positive blood culture. Improvements in blood culture technique therefore, should be welcome, particularly if they increase the percentage of positive results and simplify methods. The method here proposed seems to be about equal to other cultural procedures as far as positive results go, and certainly is a step toward simplification.

It was suggested by Wurtz that the blood of the patient contained the proper ingredients for an excellent culture medium, provided the antibacterial effects of the serum and leucocytes could be attenuated or neutralized; and that this might be attained by dilution of the blood with water. Thus the patient's blood would furnish both the culture medium and the infecting organism. A few preliminary cultures were encouraging enough to induce further investigation.

The result of this investigation seemed to prove the following: The patient's blood diluted in a test-tube of sterile water makes an excellent culture medium for a number of infections, at the same time furnishing the infecting organism. Evidence of this is found in 50 cases of croupous pneumonia yielding 38 per cent of positive cultures, 19 cases of streptococcus infection giving 47.3 per cent of positive results, and 17 typhoids with 64.7 per cent positive.

In pneumococcus and streptococcus infections, the method compares quite favorably with other cultural procedures; and in positive cases the bacteriological diagnosis can be made in nearly every instance from the primary culture within twenty-four hours. In typhoid infection the bile method is superior on account of the time element, but if the slower growth is not prohibitive, the percentage of positive results with blood-water will probably equal that with bile. They do not feel sure of the optimum dilution of blood for this work, but would suggest thirty to forty per cent if only one tube is made, and a five to ten per cent and forty per cent tube if two are taken. It is important to insure sterility of the water. The simplicity and economy of the method are obvious, and suggest its availability outside of hospitals. GEORGE E. BEILBY.

BLOOD AND LYMPH VESSELS

Bryan, R. C.: A Case of Spontaneous Cure of Femoral Aneurism. *Am. J. Surg.*, 1918, xxxii, 181.

By virtue of its superficial position, injury to the femoral artery is not infrequent. There are several methods of cure of femoral aneurisms noted in the literature, among which are cure by digital compression, by pressure, by tourniquet, by ligation of the external iliac, and finally, spontaneous cure. This latter is extremely rare, though occasionally effected by nature unaided by the surgeon. Such a case occurs very seldom, but that a cure under certain conditions may thus be brought about is no longer open to dispute.

In such a case the aneurism has always been found solid and firm, which leads to the belief that a deposition of fibrin has already taken place in consequence of the slower current in the sac, and finally fills it. This clot may extend into the vessel and thus add to the permanence of the cure. Occasionally the aneurism is cured by an embolism washing out into the efferent artery and arresting the current within the sac which fills with a firm coagulin, or the sac becomes large enough by its own weight to cause mechanical pressure upon the artery sufficient to retard, or even to arrest, the circulation in the vessel.

That there should have been repeated trauma at the site of the aneurism in the author's case, with rupture of the arterial coat, obliteration of the cavity, absence of discernible pulsation beyond, and an evident satisfactory establishment of collateral circulation, with no other phenomena traceable to the tumor formation, justifies its presentation.

The patient, colored, aged thirty-two, presented himself complaining of a tumor on the anterior aspect of the right thigh just below Poupart's ligament. He gave a history of working at a rip-saw where he had to reach over a table and had noticed that the table struck him just where the tumor now is. Examination of the heart, lungs, and abdomen were negative, as was also analysis and blood examination. The Wassermann test was 4 plus.

On the anterior aspect of the right thigh there was a large symmetrical tumor about the size of a grapefruit; the skin over this was normal, and there was no discoloration or varicose veins to be seen. The tumor was cystic in character, was not painful, there was no bruit, no pulsation, and no thrill.

Under general anæsthesia the tumor, 10 cm. in circumference, was removed and the pathologist reported it an aneurism. The patient made an uneventful convalescence and has been daily at work since. Sensation, appearance, circulation and reflexes of the leg are perfect and no evidences of aneurism formation can be noted elsewhere.

Vianney, Lacoste, and Ferrier: Arterial Stupor (La stupeur artérielle). *Bull. et mém. Soc. de. chir. de. Par.*, 1918, xliv, 1321.

The authors relate the clinical histories of certain cases of gunshot vascular lesions which they have observed and a condition which they term "arterial stupor." These are apparent contusions without any actual lesions of the vessel coats.

There are stages of this arterial stupor, the first being characterized by simple vasoconstriction; the second by complete momentary stoppage of the circulation in an important artery; a third stage in which there is a definite arrest of the circulation. This leads to gangrene of vascular origin without any arterial lesion. In no case is there a clot or alteration of the artery.

Arterial stupor in war wounds is essentially characterized by: (a) ischæmia of the limb; (b) absence of lesions of the artery. Several authors have reported such cases during the war, and it is an undoubted fact that an arterial contusion may cause such a spasm that total ischæmia of a limb may result. The fact seems paradoxical since in animals no amount of excitement appears to produce stoppage of pulsation in the great arteries. Yet from the actual clinical reports it is found that:

1. Arterial stupor, without lesion of the walls, can totally suppress the pulse.
2. Absence of the pulse, even if shown by the sphygmomanometer, is not absolute proof of destruction of the artery.
3. A functional loss of the vessel does not follow from absence of the pulse.
4. There are no clinical signs to distinguish stupor from thrombosis.
5. Arterial stupor can only be diagnosed in the course of operation during which the vessel is found without lesions.
6. An artery without pulsation must not be considered as definitely lost.

As regards treatment, it appears certain that resection ought not to be done on an artery in a condition of stupor; but no specific means are known for combating the spasm. When the mechanism of stupor is better understood, scientific means will be found to oppose it. In some of the cases reported resections have been done; in others, particularly the cases forming the basis of this report, there was no surgical intervention when the arteries were found uninjured. After some time pulsations were renewed.

W. A. Brennan.

Derache, P., and Voncken, J.: Circulatory Restoration in the Limbs After Ligature of the Principal Vascular Trunk (La restauration circulatoire dans les membres après ligature du tronc vasculaire principal). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1274.

The authors have ligated the principal vessels of the limb with results as follows: 3 cases of ligature of the subclavian artery, 2 recoveries and 1 case of gangrene; 1 case of ligature of the axillary artery, recovery; 19 cases of ligature of the humeral artery, 16 recoveries and 3 cases of gangrene; 10 cases of ligature of the femoral artery, 8 recoveries and 2 cases of gangrene; 7 cases of ligature of the popliteal artery, 4 recoveries and 3 cases of gangrene.

With regard to the circulatory results in the limb after ligation of the principal vessel, the authors find that ligation of the principal artery does not necessarily mean gangrene and that simultaneous ligature of the vein favors nutrition of the limb and diminishes the danger of ischæmia.

The symptoms of reaction observed in the limb are: (1) in the skin very rich venous arborations, especially at the root of the limb; (2) the limb is somewhat colder than the other, but keeps sufficient temperature; (3) motion is not completely abolished, especially in the flexors, probably because their blood supply is richer than the extensors.

The study of the blood-pressure in the limb is most interesting. With the Pachon instrument at the time of operation the pressure is nil. It remains at zero for a varying time, perhaps for three or four days. Then the first oscillations appear and these gradually increase. The interpretation of this is that the collateral compensatory circulation is progressively established. Absence of the pulse is the rule in these operated patients; but the progressive re-establishment of the vascular tension explains the installation of a new circulation. This is not sufficient for an entire restoration of function, but it suffices for a very satisfactory functional capacity. The authors give a number of illustrative cases. W. A. BRENNAN.

Torres y Salinas, H. H.: Varicocele and Its Treatment (El varicocele y su tratamiento). *Thesis*, Lima, 1918.

The author finds that there are two principal classes of varicocele: primary, idiopathic or essential, and secondary. The primary type may be acute or chronic.

In the operative procedures conservative techniques should always have precedence over mutilating ones. The method of Del Valle is representative of the best type of conservative technique; while Ivanissevitch and Gregorini are advocates of the mutilating methods. Del Valle's method consists in lessening the venous congestion by alternating ligatures; and by suspending the testicle at a convenient height correcting the ptosis. Del Valle has treated more than 100 cases, most of which he has reviewed for one to four years after operation. In only 1 case did he fail to obtain a complete cure and this failure was attributed to an error of technique during operation. The author has personally seen 30 cases treated by this method and it only failed in 3.

The operation is carried out in 6 stages by Del Valle and the details are described and illustrated by the author. In any conservative method the spermatic artery should be preserved and the techniques of all three authors quoted fulfil this. Del Valle's technique, however, in this regard is especially applicable in very large varicoceles.

Partial scrotectomy is indicated only in exceptional cases in which the varicose process is situated entirely on the scrotum, and as a complementary procedure when other means employed are insufficient.

According to the findings of the author and others, the different disposition of the discharge of the spermatic veins into the vena cava on the right and into the renal vein on the left constitute the principal predisposing cause of varicocele. The author finds that varicocele is to the right 416 times, as against 11 times to the left.

The author is a strong advocate of the Del Valle treatment, which on account of its simplicity of technique, its conservative character, and its application to all forms of varicocele ought to be preferred as the method of choice. W. A. BRENNAN.

SURGICAL DIAGNOSIS, PATHOLOGY, AND THERAPEUTICS

Fleisher, M. S.: Immunity and Tissue Transplantation; a Comparison of Heterotransplantation and Homotransplantation. *J. Med. Research*, 1918, xxxviii, 353.

In previous articles the results obtained when tissues were transplanted into normal and immunized animals have been reported; in all these experiments guinea-pig kidney was used for transplantation into both guinea-pigs and rabbits, thus into animals of different species. Certain differences were noted in the reaction about the transplanted tissue in rabbits and guinea-pigs; it seemed possibly of interest to determine whether these differences were dependent upon dealing with heterotransplants in the one case and homotransplants in the other.

The chief difference noted was in connection with the leucocytic reaction in the two animals; this was distinctly more marked in the guinea-pig kidney transplanted into rabbits than about the tissue in guinea-pigs. Also it appeared possible that certain other differences between the tissues in normal and immune animals might be more fully interpreted if the differences between the reactions of tissue in homologous and in heterologous animals were examined.

A series of experiments in which rabbit and guinea-pig kidney were transplanted into both rabbits and guinea-pigs was therefore carried out. In all experiments pieces freshly removed from living animals were placed in pockets in the subcutaneous tissue of the abdomen of the animals. These pieces were removed at various intervals up to three weeks after inoculation, and were sectioned for histological examination.

In only one respect were any gross differences noted between the tissues removed from the two animals. The pieces in the rabbits were not at any time as firmly fixed by connective tissue nor as distinctly encapsulated as they were in the guinea-pigs. Up to the seventh day the pieces were rather loose in the subcutaneous pocket, or were fixed at one or two points; later, however, there was a distinct and dense capsule about the tissues in the guinea-pigs. In the rabbits, however, the capsule about either homolo-

gous or heterologous tissue which appeared at the later stages was thin and was formed by a slightly thickened portion of the subcutaneous tissue. Beyond this no differences were noted macroscopically in the tissues in the two animals.

Fleisher concludes his study as follows:

Guinea-pig kidney transplanted into the guinea-pig shows active regeneration at an earlier period than does the same kidney transplanted into rabbits; eventually the degree of regeneration is the same in both animals. Rabbit kidney transplanted into rabbit shows far better regeneration than does the same tissue transplanted into guinea-pig. At best the rabbit kidney does not show as good regeneration as does the guinea-pig kidney.

The connective tissue reaction is more marked about homotransplants than about heterotransplants. In general the connective tissue reaction is more marked in the guinea-pig.

The leucocytic reaction about rabbit kidney is more marked than about guinea-pig kidney when these tissues are transplanted into guinea-pigs. A similar difference is not noted when the same tissues are transplanted into rabbits. The leucocytic reaction is constantly more marked about tissues in rabbits than about tissues in guinea-pigs. A late leucocytic reaction appears about homotransplants in guinea-pigs, but a similar reaction is not seen about homotransplants in rabbits.

The rabbit seems to be relatively better soil for the growth of guinea-pig kidney than is the guinea-pig for rabbit tissue.

In comparing homotransplants and heterotransplants one must take into consideration the general reactions which constantly differentiate the reactions about homotransplants from the reactions about heterotransplants, the individual reactions of the animals serving as host, and the special action or activity of the transplanted tissue.

Fleisher found no evidence in the experiments that the leucocytic and connective tissue reactions are the factors of greatest importance in the poorer growth of heterotransplants, but is inclined to believe that while these reactions may have some effect, the body fluids, through either the presence of injurious substances or the lack of substances necessary for the growth of the heterotransplant, are more important.

GEORGE E. BEILBY.

Loeb, L.: The Grafting of Tissues into Nearly Related Individuals in the Rat, and the Mode of Inheritance of Individuality-Differentials. *J. Med. Research*, 1918, xxxviii, 393.

Loeb's studies on the differences between auto- and homotransplantation suggested to him a connection between transplantability of tissues and tumors and the biochemical relationship of individuals. Conversely, it showed that the relationships between constituents of the blood plasma and of the body cells (tissue coagulins) could be used as a test for species of generic specificity, and these two sets of facts were correlated on various occasions.

In subsequent investigations Loeb established a connection between the duration of life and the intensity of mitotic proliferation of the transplanted tissue, on the one hand, and the species relationship between tissue and host into which it was transplanted, on the other hand. The author found that the tissues remained longer alive and showed a greater cell proliferation after homotransplantation than after transplantation into other species. Again, after heterotransplantation there was noticeable a correspondence between the degree of relationship of the species whose tissues were used for transplantation and of the species into which they were transplanted, on the one hand, and the length of life and mitotic proliferation of the transplanted tissue, on the other hand. After transplantation into nearly-related species the result was better than after transplantation into more distant species.

Loeb furthermore found that while after transplantation of epithelial tissues into the same species lymphocytes played a significant part in the destruction of the transplanted tissues, the death of the tissues after transplantation into foreign species was essentially due to the inadequacy between the transplanted tissues and the body fluids of the host.

The author carried out two sets of experiments. In the first one he used rats, and in the majority of the experiments simultaneously transplanted various tissues into the same individual. In the second set he transplanted thyroids in guinea-pigs.

In summarizing, Loeb makes the following statement:

1. Tissues transplanted from parents to children or from children to parents, or between sisters and brothers, behave in a manner intermediate between tissues after homo- and autotransplantation.

2. The difference between results obtained after transplantation from parents to children and after transplantation of tissues among sisters and brothers is so small that it may be entirely accidental. Tissues transplanted from children to mother also show an intermediate behavior, although the animals in which pieces were destroyed were relatively more numerous in this series. This result may also be accidental and due to the relatively small number of mother rats used.

3. The different pieces transplanted into the same animal on the whole agree with others in their state of preservation. While in certain cases accidental factors interfere, the results obtained in different individuals are essentially the expression of constitutional differences in the chemical structure of the individuality-differentials in these animals.

4. All degrees of variation between the two extremes of results resembling those in autotransplantation on the one hand, and of homotransplantation on the other hand are obtained after transplantation of tissues into near relatives. A half-way condition is not found. The different members of a family may behave very differently. It is as yet doubtful whether even the best results obtained

after transplantation into near relatives are quite as good as those obtained after autotransplantation, or quite as bad as after homotransplantation; it is doubtful whether the two extremes are reached. But after transplantation into near relatives animals are found in which the transplanted tissues approach the condition observed after auto- and homotransplantation.

5. In different series the maximum of the lymphocytic reaction is reached in Group C and it decreases in the direction toward A as well as toward D. The lymphocytic reaction increases with the increasing unfavorableness of the host for the transplanted tissues and with the degree of injurious action of the host on the transplanted tissue. This, however, holds good only until a certain maximum has been reached in Group C. If the destruction progresses still further and no or only very little living parenchyma is left, the lymphocytic infiltration again decreases.

6. If one compares the results thirty-six days with those forty-seven days after transplantation, a noticeable deterioration is evident in the preservation of the tissues at the later period. It may be concluded that after transplantation into near relatives the state of preservation of the transplanted pieces progressively deteriorates. It thus becomes very probable that in the large majority of cases the tissues will be sooner or later destroyed after transplantation into near relatives, and that while they will usually live longer than after homotransplantation, they will in most cases not live as long as after autotransplantation. From a practical point of view tissues of near relatives can, therefore, usually not take the place of the tissues of the same individual, although generally they will give better results than tissues taken from an unrelated individual of the same species.

7. Pregnancy of the host animal exerts in all probability an unfavorable influence on the state of preservation of the transplanted pieces.

8. The chemical characteristic which differentiates all the tissues belonging to one individual from all the tissues belonging to other individuals, including near relatives, and which is common to all or almost all the tissues of the same individual, may be called individuality-differential. The author has shown that the individuality-differential is not inherited according to the rules of alternating mendelian heredity of simple monohybrid characters, but that all degrees of blending are observed. One may conceive of all gradations from individuality-differentials to differentials in near relatives, in members of the same strain and the same species, and ultimately of different though nearly related species as corresponding to gradually increasing quantative differences in the same substance present in the majority of the tissues of the same individual. The inheritance of these individuality-differentials is distinct from the inheritance of other characters of organs and tissues. Both may follow rules of heredity. GEORGE E. BEILBY.

Jones, F. S.: Studies in Bovine Mastitis; Non-Hæmolytic Streptococci in Inflammation of the Udder. *J. Exp. Med.*, 1918, xxviii, 149.

This study was undertaken to define more accurately the species of organism responsible for disorders of the mammary glands of cows, and if possible to lighten the economic burden imposed upon dairying by these affections. In addition, a more complete description of the biological characters of bovine streptococci obtained from inflamed udders seems desirable for the purpose of assisting in the public problem of milk-borne epidemics of tonsillitis.

Much of the material has been obtained from a large dairy herd. Mastitis was more or less endemic. During 1916 it was necessary to dispose of 65 cows because of chronic mammitis. In addition to the actual loss from chronic cases, many animals developed milder forms of the disease generally evidenced by flocculi in the milk and inflammation of the gland. Milk from such quarters was discarded and represented an absolute loss. It is interesting to note that during 1916 the number of animals disposed of because of chronic mammitis doubled the number reacting to tuberculin. It has also been possible to obtain clinical data and samples of milk from other sources.

The following routine procedure is used in obtaining milk from inflamed udders. Milk from the affected quarter is drawn directly into a sterile six-ounce wide-mouthed bottle, and except in winter it is iced at once. A note is made of the animal's general condition and the appearance of the involved quarter. The animal's herd number and its location in the various barns is recorded. The milk is usually plated within a few hours in dilutions of 1:10, 1:100, and 1:2,000. Culture medium employed in all initial examinations consists of 1 ccm. of defibrinated horse blood and 12 ccm. of 2 per cent veal bouillon agar, to which is added the diluted milk, and the whole plated. The effect on hæmoglobin is noted at the end of 24 and 48 hours. Readings are always made from deep colonies.

From this study the author seems to have clearly established that non-hæmolytic streptococci are responsible for a considerable number of cases of bovine mastitis. Of the 81 animals examined, 31 were suffering from infections of this type. The lesions produced in invaded quarters varied from an involvement of only the lining epithelium of the large milk-ducts to severe degeneration and necrosis of the secreting epithelium. In one instance a considerable portion of the glandular elements had been replaced with connective tissue.

The streptococci fall into two groups when their action on the various carbohydrates is considered. Thirty-four strains fermented dextrose, lactose, saccharose, maltose, and salicin; five others attacked the first four sugars but failed to produce acid in salicin. All mastitis streptococci failed to act upon raffinose, inulin, or mannite. One species isolated from a mammary abscess produced acid in all the carbohydrates.

All the strains were agglutinated with an antiserum prepared from one typical strain. The agglutination titer varied over wide limits, although all the streptococci were agglutinated at a dilution of 1:500. None of the strains inoculated proved pathogenic for rabbits. A pig fed on the milk from two typical cases of mastitis remained well. GEORGE E. BEILBY.

ROENTGENOLOGY

Brown, P., and Young, J. S.: Clinical Observations in Military Roentgenology. *Am. J. Roentgenol.*, 1918, v, 407.

The localization of foreign bodies constitutes by far the greatest part of the surgical roentgenology at the military stations. Speed was a prime essential and for this reason the simplest methods consistent with accuracy were employed. A simple parallax method or an equally simple "displacement" method, such as the Strohl, were found to answer the requirements in most of the cases.

Foreign material injected into the wound for the purpose of producing antiseptic action was found at times to interfere materially with proper localization of foreign bodies. Thus the so-called bismuth-iodoform-paraffin paste of Morison casts distinct shadows which at times obscured the foreign body or closely resembled such shadows. It was usually possible to dissociate the respective shadows by movement either of the subject or of the tube. Other extraneous factors, such as Carrel tubes, were found at times to offer difficulty in differential diagnosis by roentgen ray. The inclusion and exclusion of secondary rays was utilized to advantage at times to determine the presence or absence of a foreign body in any given field. ADOLPH HARTUNG.

HOSPITAL, MEDICOLEGAL, AND MEDICAL EDUCATION

Bradford, E. H.: The Need of Systematic Teaching of Hospital Internes. *Boston M. & S. J.*, 1918, clxxix, 229.

The government needs well qualified young physicians and demands a year of hospital service. This secures to the hospital a certain supply of young medical officers.

In return, the hospital should arrange that residents receive systematic instruction during their year of service, which demands:

1. Systematic instruction from the hospital authorities and staffs.
2. Authorized conferences on hospital cases.
3. Condensed and systematic case records.
4. An arrangement of hours of work permitting time for study.
5. Co-operation on the part of hospital authorities with medical educators, and supervision by state licensing boards of medical education to secure proper hospital standardization.

The demands of the community for properly trained medical practitioners require hospital training in addition to adequate medical school instruction. This throws upon hospitals an added responsibility; that is, the maximum of hospital educational opportunity.

MILITARY SURGERY

NOTE.— Readers are referred to the Table of Contents for other articles dealing with military surgery which appear under the various headings according to our anatomical arrangement.

Robinson, F. W.: Suggestions for the Treatment of Septic Wounds. *Brit. M. J.*, 1918, ii, 184.

As a result of much work and research at the front, it has been conclusively proven that, owing to the condition of the soil, wounds are infected from the first. It has also been shown that modern germicides, on account of their low penetrating power, are unable to reach the infected areas which lie in the lacunar spaces beneath and outside the wound itself.

As a result of these researches, the physiologic treatment of wounds by irrigation has largely superseded the older methods. This treatment, however, cannot be applied in the very earliest stages, when it is so necessary. As a consequence, gangrenous and septic processes have already begun in the wound before irrigation can be applied. This accounts for the large number of unhealthy and adherent cicatrices with their resulting disability. Whatever treatment is adopted must be prompt and should aim at reaching in the earliest stages these outlying infected areas. It would seem that to throw around these infected areas a circle of bacterial serum would most nearly approach the conditions required and would best anticipate the irrigation which is to follow.

In South Africa the author adopted a crude but effective method. He grasped the wound with the left hand well beneath its base, at the same time drawing it well forward and making the thumb and fingers compress the tissues tightly. He then transfixed with a needle, entering the point immediately beneath the tips of thumb and fingers. In a similar manner he transfixed the tissues about an inch beyond each end of the wound, taking care to include the same depth of tissue. He then passed a rubber ligature around the wound beneath the needles. This was tightened to the desired extent and fixed by a clip.

The instrument consists of two slender looped splints, a system of wormed needles with detachable points and nuts. In this way the splints are made to approximate each other and so compress the intervening tissues. By transfixing the tissues,

an immobility is obtained in an easy manner. The edges of the wound are quite flaccid and tend to fall together. In the compressed area the circulation is controlled and easily regulated. The physiologic engorgement ensures a flooding of the basal areas with bacterial serum and the infected interstices and lacunæ are in this way reached. One effect of compressing a circumscribed area of tissue well outside the margins and base of the wound is to elevate, unfold, and flatten out both the basal and other parts of the wound itself. The base of the wound is thus rendered more superficial and adaptable for any surgical toilet necessary. The lymphatic spaces are opened out and easily reached.

Where there are wound diverticula at the base, some modification is required, and the ligature in these cases plays the most important rôle. Small portions of tissue are pinched up and transfixed and retained by small splints. An encircling ligature is thrown around the wound, passing beneath the needles and drawn tightly.

This method of handling a wound permits a complete toilet. The bactericidal serum enhances the defensive properties of a wound. During the progress of healing the perfect immobility of the compressed area gives the best condition possible for the building up of healthy scar tissue.

The practice of packing a wound with an unabsorbable dressing is a familiar example of the continued disturbance of growing granulations wherever such a dressing is removed. This means delay. Any dressing to be applied to a granulating wound should possess three qualities: It should be absorbent, so that the plastic lymph could be held in its meshes for nourishment of the ingrowing plasma cells; absorbable, so that the dressing could yield and gradually be replaced by new tissue; perforated, so that drainage could be obtained in the early stages, and the graft thus be enabled to adhere to the granulations. Otherwise the dressing is liquefied and prematurely absorbed.

For the development of perfect scar tissue, absolute rest in the healing zone is necessary. A healthy scar should be smooth, elastic, free from adhesions, and non-contractile. V. C. HUNT.

Baer, W. S.: Primary and Delayed Primary Suture in the Treatment of War Fractures. *Am. J. Orthop. Surg.*, 1918, xvi, 513.

The indications and results of primary and secondary suture in the treatment of war fractures are considered, and the author states that the principles have been established on certain grounds.

All war wounds are considered infected. Projectiles, clothing, and devitalized tissue should be removed in at least twelve hours. The surgeon, the radiologist, and the bacteriologist should all work in harmony. The radiograph is taken upon entrance into the hospital, the fracture described, and the projectile located. The bacteriologist determines the type of organism; the surgeon must be able to do clean surgery. The handling of tissues is reduced to a minimum.

Primary suture is successful in from 80 to 95 per cent of cases. Obvious reasons are given for the employment of this method. About 10 per cent of wounds, even though they arrive in the first twelve hours, cannot be closed because of shock, size of the wounds, lack of X-ray apparatus, failure to locate the projectile, or great loss of substance.

Delayed suture is done in those cases where primary suture would have been accomplished except for reasons generally military. The technique is the same, except that the skin edge is not brought together until ten or eleven days later. Primary suture cases must be kept at the place of operation for at least ten days. Delayed suture cases can be sent to the rear six or seven hours after operation, then closed on the third or fourth day, with 80 to 87 per cent of cures.

The author points out the great advantage of converting a compound infected fracture into a simple one, which is the key-note of primary and delayed suture. The infection of the bones is most often through the soft parts, but with this method, as high as 89 per cent of the infected compound fractures have been changed into simple aseptic fractures. The author strongly advocates team work and constant consultation for the proper carrying out of this technique. C. C. CHATTERTON.

Scruton, W. A.: Examination of Applicants for Aviation Service, U. S. Army; Disqualifying Factors in 1,500 Cases. *Ann. Otol., Rhinol. & Laryngol.*, 1918, xxvii, 528.

The author presents a record card showing the various reasons for rejection. Of 1,364 flyers examined, 514 or 38 per cent were rejected. Only 21 out of the 1,364 flyers were rejected for failing to respond correctly to the rotation tests.

The author lays stress upon the careful attention to the minutest detail relative to technique, stating that the cause of cross-pointing and divergent pointing is absolutely an improper position of the head during rotation. The flyer must have a perfect aural mechanism, perfect vision, no fundus changes, excellent heart and lungs, sound teeth, and no form of hernia. OTTO M. ROTT.

GYNECOLOGY

UTERUS

Watson, B. P.: Cancer of the Cervix Complicating Triplet Pregnancy. *Am. J. Obst.*, N. Y., 1918, lxxviii, 347.

The author reports the case of a woman, aged thirty, para-V, who had nothing in her past obstetrical history worthy of note. She entered the hospital in the fifth month of pregnancy. Her last regular menstrual period occurred January 3, 1917. Until the first week of March there was no vaginal discharge of any kind, but from that time until her admission to the hospital she lost blood more or less continuously. The flow was more marked when she was moving about. It was sometimes bright red, sometimes dark in color. Clots were often passed and for the month previous to admission a foul purulent discharge had been present. She had noticed the abdomen enlarging and had felt fœtal movements for two weeks prior to admission.

The cervix was large, the posterior lip smooth, the anterior lip eroded, the surface friable, the canal slightly patulous and admitting the finger. Friable tissue could be felt extending up the anterior wall of the cervical canal. It bled readily on examination. The Wassermann test was negative.

At operation the uterus was found to be larger than had been expected, very soft and fluctuating. The uterus was opened in the middle line. On rupturing the membranes, one fœtus was delivered, then another was felt and delivered, and finally a third. The fœtuses were apparently about the fifth month. As one placenta was bulging through the opening, all the placental tissue and membranes were removed and the opening in the uterus closed with a few interrupted sutures. The Wertheim operation was then proceeded with. The patient made a rapid and uneventful recovery and was discharged six weeks after operation.

Another case of cancer of the cervix is reported in a woman, aged thirty-two, para-V, who was five months' pregnant. A Wertheim operation was done. Six months later the patient died following a nephrectomy due to obstruction by cancer causing hydronephrosis. EDWARD L. CORNELL.

Broun, L.: A Study of 1,500 Selective Cases of Myomata Uteri Operated upon at the Woman's Hospital, 1910 to 1917. *Am. J. Obst.*, N. Y., 1918, lxxviii, 410.

As a result of the operations, 28 patients died; of these 7 died from embolus, chiefly between the eighth and twentieth day, 7 died from peritonitis, and the remainder from various causes. The percentage rate is 1.86. Sixty-six malignant conditions were found, of which 29 were unquestionably determined before operation. There were 58 cases of associated ovarian pathology. There were 265 cases of associated tubal disease, the majority of which would have required surgical interference at some time. Tubercular endometritis was present in two instances, and in 105 myomata necrotic or calcareous changes were present. One hundred and sixty-seven chronic or subacute inflammatory appendices were found. There were 9 instances of associated extra-uterine pregnancy and 51 of normal pregnancy. Of the 1,500 consecutive myomata operated upon, 23.7 per cent contra-indicated the use of radium and X-ray.

Any myoma needing interference that cannot be completely mapped out by bimanual examination and known to be free from coincident complications should have surgery advised, unless there is a decided physical contra-indication as in heart, lung, or kidney disease, or in any other condition presenting a bad surgical risk. EDWARD L. CORNELL.

Schmitz, H.: The Treatment of Certain Hæmorrhages of the Uterus with Radium and Roentgen Rays. *Med. & Surg.*, 1918, ii, 714.

In 643 consecutive gynecological cases that came under the author's observation at the Willard and St. Mary's hospitals, 135, or 21 per cent, were accompanied by uterine hæmorrhage due to an underlying genital disease.

Fifty-six out of these 135 cases were characterized by a proliferation of uterine tissue. Thirty-two, or more than one-half of the 56, were caused by new-growths, and of these 19 were the result of carcinomatous formations. If to these 56 cases are added the 6 cases of hæmorrhagic metropathy or essential hæmorrhages, a total of 62 cases is obtained which formerly indicated repeated curettages and finally hysterectomies to relieve the patient. The cancers and myomata, of course, were always extirpated if operable.

If, in essential uterine hæmorrhages and hyperplasis of the endometrium and myometrium, medicinal and local mechanical treatment or repeated curettage do not bring about cessation of the hæmorrhages, actinotherapy is indicated.

The use of radium is preferable to that of the X-ray. One hundred and eighty-nine cases of uterine hæmorrhages were subjected to treatment with radium and roentgen rays. The indications were painstakingly observed. In 126 cases the hæmorrhage resulted from malignant disease of the cervix, in 3 from cancer of the corpus, in 15 from myomata, in 39 from hæmorrhagic myopathies and myomatoses uteri, and in 6 cases from chronic catarrhal endometritis.

Several cervical and corporeal cancers have re-

mained well following a period of four to five years. Yet it was evident that the results of radium and roentgen ray therapy are palliative and, in only a very few cases, curative. Hæmorrhage, pain and discharge are temporarily arrested. Thirteen of the 15 cases of myomata uteri were permanently relieved, the tumor disappearing within six to nine months in all but a few of the cases.

EDWARD L. CORNELL.

Crutcher, H.: The Control of Hæmorrhage in Vaginal Hysterectomy. *Med. Rec.*, 1918, xciv, 501.

The control of hæmorrhage in vaginal hysterectomy is accomplished by a clamp which is long, broad, somewhat elastic, and of a strength many times beyond what may be supposed to be the actual necessities of the case. The blades of the clamp must be long enough to overlap the broad ligament at one grasp; broad, that the tissues may not be cut by its application; and elastic, that no subsequent slipping may be possible through shrinkage of the pedicle.

The clamp has a tongue-and-groove blade. The lock is made up of a ring which slips over grooves in the outer side of the handles.

The clamp is allowed to remain forty-eight hours.

EDWARD L. CORNELL.

Norbury, F. P., and Dollear, A. H.: The Menopause from the Standpoint of Mental Disorder. *Illinois M. J.*, 1918, xxxiv, 77.

Modern classification of mental disorders recognizes no form of properly classed climacteric mental disorder. The form of psychosis is usually dependent upon neurotic inheritance and history of neuroses and of former mental disorder. In frank psychoses, over one-half have a neurotic inheritance. Psychoses occur more frequently in married women, but widows and single women who have been active in business or professional life are quite prone to the disorder. It is not the hard work, but the stress, the changed circumstances, the emotional shocks, the disappointments, and realization of the passing years, etc., operating under the stress of the involutional period that bring about the psychosis.

Exhaustion is quite common at this period, even to those who have withstood acute illness, childbirth, accidents, etc., only to have the involutional changes lower the mental threshold sufficiently to precipitate a psychosis. This is more apt to occur where the prodromal period has lasted over several months and has been recognized.

Again, the form of the mental disorder may be purely a symptomatic depression, but the most common form is involutional melancholia of which, in women, the menopause is the most important factor. While every depressed patient is potentially suicidal, yet, in involutional melancholia, this feature must be warned against by the physician from the very beginning.

The duration is largely dependent on the early recognition that something is wrong. The prodromal period with sleep disorders, insomnia, dream states, etc., should be the guide of foreboding dangers. Nervous exhaustion is the usual diagnosis, and diversion, rather than rest, is the usual prescription, both by physicians and relatives. Not infrequently a surgical operation is suggested to meet a surgical condition, but with the hope that the surgical pathology is the basis of the depression, both physical and mental. The mental pathology has in most such cases been overlooked and, when recognized, postoperative psychosis is more apt to be the diagnosis than to consider postoperative phenomena as purely episodic. The real psychosis began long before operation was thought of.

Slowly the psychosis develops and slowly recovery takes place. One to three years is the usual duration; with the average, under intensive treatment, about eighteen months. It is rare that the duration is less than a year.

Hospital treatment and care, with its organized service, is an absolute need to meet all of the conditions indicated in the proper treatment of the psychoses of the menopause.

EDWARD L. CORNELL.

ADNEXAL AND PERIUTERINE CONDITIONS

Tagliavacche, N.: Two Cases of Menstrual Abdominal Fistula (Sobre dos casos de fistula menstrual del abdomen). *Rev. Asoc. méd. argent.*, Buenos Aires, 1918, xxviii, 615.

The author gives particulars of two cases of menstrual abdominal fistula, one personal case and one unreported case observed by Gutierrez in 1912. The only other case which the author can trace in literature was reported by Bello in 1915. In the cases of Bello and Gutierrez the abdominal fistula was an inevitable result, since the necessity of draining suppurative collections in the lower pelvis obliged the operators to incise the abdominal wall. This ultimately led to the formation of a fistulous tract in connection with the utero-adnexial suppurative processes.

In the author's case the patient had undergone a left oophorosalpingectomy for suppurative adnexial cysts. This was soon followed by the appearance of an abscess in the inferior extremity of the incision. The patient returned to the hospital for treatment. The abscess was incised but did not cicatrize and the suppuration continued with an abundant flow of blood during the menstrual periods, in addition to the natural flow.

A median infra-umbilical laparotomy was done. The stump of the left tube was found adherent to the abdominal wall and this was, in the author's opinion, due to defective technique during the salpingectomy. Not only had the interstitial portion of the tube been left, but also a large part of the internal extremity, and owing to failure of peritonization this led to the contraction of adhesions

between the stump and the abdominal anterior wall. Later infection completed the work of fistulization.

The author states that the case shows that simple ligature and section of the internal extremity of the tube ought to be discontinued and preference rather given to those methods which in a total salpingectomy not alone assure complete extirpation, but also peritonization of the bleeding surfaces. This is effected by the V-incision in full uterine tissue, as Webster has shown, or by cuneiform resection, or even by plastic procedures. The necessity for some such process is manifest, since failure of peritonization of the stump may give rise to other serious infectious peritoneal complications. W. A. BRENNAN.

Warner, F.: Conservative Surgery in Operations upon the Fallopian Tubes, with Reference to Future Pregnancies; Report of Two Cases. *Med. & Surg.*, 1918, ii, 731.

Pus-tubes of gonorrhœal origin usually seal the fate of a woman's future pregnancies. Pus-tubes due to other germ origin, as the streptococcus following abortion, are perhaps less likely to interfere with a possible pregnancy. In young women without children, it is preferable not to disturb the tubes unless the menace of purulent inflammation presses the surgeon to an operation.

If an operation is undertaken, a sufficiently conservative operation should be done which will make it possible for pregnancy to occur, if the salpingitis be in a young woman. In older women with children, pus-tubes from whatever cause should be removed.

If the pus-tubes are due to gonococci, as they usually are, and the uterus is enlarged and evidently involved in the same type of inflammatory disturbance as the tubes, a total or partial hysterectomy should be made.

An ectopic pregnancy occurring in a young nullipara should call for the removal of the one tube. An ectopic pregnancy occurring in a multipara should call for the removal of both tubes, for both are probably divested of their ciliated epithelium, which will render probable a like pregnancy occurring in the remaining tube. EDWARD L. CORNELL.

Curtis, A. H.: The Bladder of Women After Operation. *Am. J. Obst.*, N. Y., 1918, lxxviii, 230.

This paper is a consideration of postoperative bladder disturbances, with special regard to treatment based on a study of this subject in the care of 465 cases operated upon within the preceding eighteen months. Of these cases, 213 were abdominal, 188 vaginal, and 64 combined abdominovaginal cases.

Of the abdominal cases, 135 were not catheterized and possessed normal bladder function. Seventy-eight were catheterized, 21 of which were so treated many times. The author refers to these 21 as most instructive. Almost without exception, their bladders after re-establishment of spontaneous micturition yielded residual urine when tested, this residual urine decreasing in amount almost daily with the return to normal within a week. Where patients were not tested for residual urine after prolonged catheterization, pus usually appeared in the urine, with symptoms of cystitis. "It would seem that no course of procedure is more pernicious than that of regular use of the catheter over many days, followed by abrupt cessation of all catheterization, on the assumption that as soon as the patient begins to void, the power of thorough evacuation has returned."

Of the 188 vaginal operations, 138 patients were not catheterized and had apparently normal bladder function. Fifty patients were catheterized, 14 but once or twice, 36 more often. Residual urine was found to be present here, as in the previous group, oftener where the bladder had been directly involved in the operation, i. e., transposition cases, vaginal hysterectomy, etc.

The third group of cases, 64 in all, served to emphasize the same points with respect to residual urine upon the resumption of spontaneous urination after prolonged catheterization.

Stasis of urine, therefore, is believed to be the chief cause of bladder troubles after operation. Treatment has been based upon avoidance of urine stagnation. The result has been that postoperative urinary tract infections have disappeared since the institution of this principle of treatment.

"There are many cases of functional inability to completely empty the bladder. This is notably true of the bladder of pregnancy. Through judicious catheterization, immediately after urination, it is believed that these patients often can be saved from the dangers of pyelitis of pregnancy. A similar treatment of the failing bladder of tabes, at a time when moderate function still remains, promises much help if combined with intensive antisyphilitic therapy." CAREY CULBERTSON.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Deacon, M. A. S.: Thoughts on the Employment of Pregnant Women in Munition Factories. *Lancet*, Lond., 1918, cxcv, 311.

The factory from which the following report was compiled is built on the site of a farm in flat, open, and well-drained fields. There is an abundance of fresh air and sunshine. All the buildings are very well ventilated with cross and end-to-end through draughts, and the sanitary and bath accommodation is in excess of the Home Office requirements. The factory is particularly well managed.

The factory is situated a mile from the station and tram terminus, and all workers have of necessity to walk this mile as there is no other way of reaching their work.

Of the 101 pregnant women, 46 cases terminated successfully with 47 children before the end of February, 1918, when this report was made up. One woman had twins; 7 cases could not be traced, but were in good condition when last heard of. Thirty-four cases had not entered labor at the end of February, but of these 19 have terminated successfully since.

There were 2 premature births and 13 early abortions, that is, before the third month of pregnancy. Of the 2 premature cases, one had operation for advanced carcinoma of the cervix at five months and the other contracted syphilis at six months, the baby being born dead at eight months.

The 13 miscarriages were all very early, from five to ten weeks. Of these, one patient fell out of bed and miscarried three days later, another fell downstairs, a third had tuberculous trouble, and a fourth previous miscarriages.

It is possible that some births do not appear in this report, as women may have had confinements without reporting their condition. It is, however, unlikely that there have been more miscarriages than recorded, as all workers who are absent for three days consecutively are visited at their homes and inquiries made into the reason for such absence, so that miscarriages could hardly escape notice by reason of this factory regulation.

Records are still being kept of such cases; and since the workers do not fear dismissal and know that an interest is taken, they willingly give information of their condition. Thus they are kept under observation even after they leave, with the result that next year's records will be more complete than those for the nine months to February, 1918. All the women seen since confinement report that they have had easy labors, healthy children, and that their physical condition during pregnancy was excellent.

One woman who worked until ten days before her confinement bore her first healthy baby out of eight. Another has has twelve pregnancies, but only one other living child. A third had had seven other children, and this last the healthiest. All the women found the walk to work beneficial and never felt so well before.

EDWARD L. CORNELL.

Piccardo, T. J.: The Ovular Theory in the Etiology of Extra-Uterine Pregnancy (La teoria ovular en la etiopathogenia de la preñez extrauterina). *Rev. de obst. y ginec.*, Buenos Aires, 1918, ii, 219.

The generally accepted opinions that tubal development of the fecundated ovum was consequent on detention in its normal progress owing to stenosis of the duct from pathological or congenital conditions led the author to investigate whether this was really the casual factor. In 1903 he published a work in which he maintained that tubal conditions were only secondary factors, and that the tubal insertion of the ovum was clearly an ovular phenomenon, dependent upon structural alterations in the ovum itself.

The present article is an analysis of the author's further studies and recent observations by others. From this study the following conclusions are drawn:

1. The fimbria takes no part in the intratubal transmission of the ovum, whether fecundated or not.
2. The fimbria of the tube, like the uterine epithelium, protects these organs and the peritoneal serosa.
3. The intratubal migration of the ovum is due to peristalsis of the tube, and this is favored by mucus segregated by cells undergoing epithelial transformation.
4. By the passage of the ovum the mucosa of the tube undergoes decidual transformation which renders the inclusion of the ovum possible.
5. If this inclusion is not effected, it is because there is synchronism between the ovular transformations (formation of trophoblasts) and the arrival of the ovum at the uterine cavity.
6. When an ectopic inclusion does occur this synchronism is disturbed by the premature development of the trophoblasts, due to the exaggerated genetic power of the included ovum.
7. It is probable that this exaggerated genetic power is not alone of ovular origin; the corpus luteum contributes to it; or it may even be helped by simple functional disturbances or by structural alterations of inflammatory origin.
8. Ectopic pregnancy is frequently seen to occur in women with apparently healthy genital organs.

9. The inflammatory processes caused by the mucosa are unfavorable to tubal impregnation of the ovum, except in cases when the alteration is very slight and permits the mucosa to recover its normal characteristics. W. A. BRENNAN.

Altman, J. T.: Toxæmias of Pregnancy. *J. Arkansas M. Soc.*, 1918, xv, 45.

In this article the author discusses the origin, cause, and symptoms of toxæmia of pregnancy. Toxæmia means that the blood contains poisons of probably alkaloid nature or substances similar to them. These toxins are supposed to be derived from two sources, maternal and fœtal. Maternal toxins are those arising from morbid or deficient processes occurring in the liver, kidneys, thyroid, and perhaps others of the ductless glands. Those of fœtal origin are supposed to be derived from waste or by-products of the fœtus or of the placenta. These toxins, of whatever nature, are retained in the body of the mother or they are not sufficiently oxidized to render them harmless or easy of elimination.

While the author is of the opinion that every pregnancy is attended by a certain amount of autointoxication, the constitution of a perfectly normal woman meets these demands without external symptoms or signs of disease. Predisposing causes of this condition are nausea, neurasthenia, anæmia, and predisposing disorders of the kidneys, liver, intestinal tract, etc. The symptoms of the milder causes are characterized by headaches, dizziness, spots before the eyes, irritability, œdema, nausea, and vomiting, constipation, and in some cases diarrhœa and disturbed kidney action.

The author makes it a rule to impress upon his patient the importance of reporting the above symptoms and he points out to them the danger signals, namely, severe frontal headaches, spots before the eyes, and severe or persistent epigastric pain. General examination of these patients usually shows evidence of deficient elimination, muddy skin, dry, coated tongue, reddened gums, pulse or low tension, tympany and tenderness over the liver.

Pathologic anatomy of these cases is not very instructive, as they are not often fatal. Treatment is symptomatic. C. D. HOLMES.

Titus, P.: Uterine Inertia; Summary of a Series of Cases. *J. Am. M. Ass.*, 1918, lxxi, 890.

The distinction between uterine inertia and uterine exhaustion is sharp since the contractions of the uterus in the former condition are inherently ineffective, while in the latter condition their force has been spent against some obstacle.

According to this distinction, based on etiology, it is incorrect to call the former condition primary inertia and the latter secondary inertia.

Differentiation between inertia and exhaustion is important from the standpoint of treatment, that of the former being more or less expectant, while that of the latter should be prophylactic and directed against the obstacle to delivery.

True inertia begins in the first stage of labor. If the membranes are unruptured, the treatment consists in the use of mild uterine stimulants alternating with periods of rest induced by narcotics, until the second stage is reached, when active interference may be undertaken if necessary. If the membranes are ruptured, interference may become imperative on account of elevation of temperature, or the pulse of the mother, or alarming changes in the fœtal heart rate. This interference includes Duhrssen's multiple incisions of the cervix and vaginal cæsarean section, both followed by forceps delivery or the use of cervical bags.

Interference in the second stage is not as serious as in first stage and consists principally in delivery by forceps. Frequent vaginal examinations are to be avoided and rectal examinations should be their substitute.

Premature rupture of the amniotic sac is a common cause of inertia in a patient otherwise well and strong, whereas constitutional defects, over-distention of the uterus by twins, hydramnios, and frequent pregnancies are also important etiologic factors in producing this condition.

Retention of the placenta with or without hourglass contraction of the uterus is a common result of inertia extending into the third stage, and hæmorrhage is likely to occur during and after the placental stage. EDWARD L. CORNELL.

LABOR AND ITS COMPLICATIONS

Slemons, J. M.: The Significance of Fever at the Time of Labor. *Am. J. Obst.*, N. Y., 1918, lxxviii, 321.

The histological picture presented by the placenta in 34 cases has been studied. Typically, the bacteria are found in the subamniotic connective tissues where they come in contact with the large fœtal blood-vessels which cross the surface of the placenta. Occasionally it is possible to demonstrate bacteria in the act of penetrating the walls of the vessels. In most instances the epithelium covering the villi is intact; the capillaries within the villi are normal and bacteria are not demonstrable on the surface or in the interior of the villi. Under these circumstances it is evident that the infection does not proceed from the maternal circulation and does not pass through the walls of the villi. Bacteria enter the placenta by way of the amniotic membrane and the amniotic fluid. Generally the latter becomes infected because the membranes rupture prematurely, labor is prolonged, and repeated vaginal examinations are made.

As placental infection is usually limited to the amniotic surface of the placenta, the complication is more likely to be serious for the infant than for the mother. Not infrequently infection of the fœtus leads to its death either shortly before or within a few days after it is born. If the author's

experience is not unusual, placental bacteræmia as a cause of fœtal death is outranked only by syphilis and birth injuries.

The frequency of this phenomenon is such as to make it a matter of considerable practical importance. In one series of 600 labors, placental bacteræmia was noted in 10 instances; in another series of 1,000 labors it occurred 24 times. On this basis, its frequency is 2 per cent of all labors at term. In other words, the incidence of placental bacteræmia and of intrapartum fever is identical.

EDWARD L. CORNELL.

PUERPERIUM AND ITS COMPLICATIONS

Miller, H. A., and Chalfant, S. A.: The Treatment of Puerperal Blood-Stream Infections by the Means of Arsenobenzol; with a Report of Cases. *Am. J. Obst.*, N. Y., 1918, lxxviii, 395.

With the use of intravenous injections of arsenobenzol, it has been possible in every instance to rid the blood stream of its invading organism. All varieties of organisms so far encountered seem to be equally influenced.

Cultures from localized abscesses are usually identical with cultures from the blood stream. Cultures from the uterus, although this same organism is predominant, are rarely pure cultures.

Reinfections from focal infections may and do occur, but are not so readily influenced by the arsenobenzol as the original infections.

The leucocyte count is usually low in comparison with the temperature and pulse. After arsenobenzol has been given, there is a marked increase in the count. If, after this time, there is a decided decrease in the leucocyte count without a corresponding improvement in the patient, it is probable that the patient has reinfected herself, and arsenobenzol may be given without waiting for confirmation of this by laboratory report

In the cases the authors have had the blood stream is usually found to be sterile in twenty-four hours, always in forty-eight hours. Rabbit experiments made by Allison of the Singer Memorial Laboratory would indicate that a dose of 6 mg. is necessary to secure prompt results.

In suspected blood-stream infections, arsenobenzol may be given immediately after a culture has been taken, in order to avoid the delay incident upon waiting for a laboratory report.

Eleven cases are reported.

EDWARD L. CORNELL.

MISCELLANEOUS

Copeland, G. G.: Blindness of the Newborn; a Preventable Disease. *Canad. M. Ass. J.*, 1918, viii, 724.

The latest statistics representative of Ontario and, therefore, probably true also for the other provinces of Canada are presented: 33.5 per cent of the students of the Ontario School for the Blind at Brantford are blind from the effects of venereal disease; 22.6 per cent are blind as a result of gonorrhœa; 23.3 per cent are blind as a result of venereal disease present at or contracted at birth; 22.6 per cent are blind from the effects of ophthalmia neonatorum.

All cases of ophthalmia neonatorum were considered gonorrhœal. A small number were blind at birth from interstitial keratitis and optic atrophy.

EDWARD L. CORNELL.

Belove, B.: Prevention of Deformities in Time of Peace and War. *J. Missouri St. M. Ass.*, 1918, xv, 317.

Prevention of deformities should begin with the newly born baby. All infants should be examined as early as possible for possible deformities or conditions that may develop into deformities later, and the proper measures should be taken at once.

When one considers what a great percentage of the young manhood of the country is not able to perform military service on account of disabilities, a great many of which could have been prevented in early childhood and school life, it is evident that the subject of prevention of disabilities deserves more earnest consideration. EDWARD L. CORNELL.

GENITO-URINARY SURGERY

KIDNEY AND URETER

Greenberg, G.: Use and Indication of Endoscopy. *Med. Times*, 1918, xlvi, 209.

Urology is now one of the most precise branches of medicine. For visualization of lesions the most common indication of the urethrescope is for diagnosis and operation in gonorrhœa where the acute stage has abated. Inspection from bulb to meatus in many cases whose adnexa are involved may prevent the lapse into a chronic stage. The color of the mucosa varies, being more intense in the bulb than in the spongy urethra. Elasticity, thickness, consistency, and striæ, the shape of the lumen, glandular involvement seen only in diseased conditions; lacunæ infections and invagination or diverticula which may harbor infectious material indefinitely can be seen.

Progress of the disease may be recorded diagramatically. A veritable panorama from the sphincter to the meatus is obtained in chronic gonorrhœa. With the colliculus seminalis relatively intact, in a surprisingly large number of cases a state of diffuse inflammation in the lateral prostatic sulci in the supramontane region almost as far as the sphincter, and in the roof of the urethra indicates the presence of follicular prostatitis.

Hæmaturia is commonly due to an ulcer behind a tight stricture; these are primary lesion ulcers in the foremost part; in the last stage tuberculous ulcers in the prostatic urethra, chancroidal and malignant ulcers or traumatic ulcers from the breaking of a chordee. There are no ulcers from gonorrhœa other than traumatic.

The author discusses the development and merits of an instrument formerly described by himself.

H. W. PLAGGEMEYER.

Robins, C. R.: Recurrence of Stone in the Kidney. *Surg., Gynec. & Obst.*, 1918, xxvii, 270.

The recurrence of a condition for which a surgical operation has been performed is an important matter and merits serious consideration. The publication by Cabot and Crabtree in 1915 of a study of end-results was somewhat startling. This showed a recurrence of 49 per cent of the cases of kidney stone and 29 per cent of ureteral stone. A review of 450 patients by Braasch and W. J. Mayo showed a recurrence of about 10 per cent. Robins had four cases of recurrence under treatment at the same time, each showing a different type of recurrence.

In commenting on these cases and reviewing the literature, he showed that there appears to be no established or understood cause for the formation of stone that coincides with clinical observations; that there is no general treatment directed to the prevention of formation of stone that seems to be effective; that infection plays an important rôle, but is not an invariable cause and is subject to vagaries that cannot always be explained; that the anatomical cause was shown to be effective in one of his cases which recurred twice in the same location; that while the type of operation must be important in preventing recurrence, one of his cases recurred in the opposite side after a nephrectomy and one in the opposite side after a nephrotomy and drainage but no stone in the drained kidney.

He concludes that recurrence is evidently more frequent than supposed and that patients may have a stone and still be in comparatively good health, even where there has been a recurrence. He thinks the removal of stones is indicated for good and sufficient reasons, and that further study should be given to the causes of the formation of stone with a view to preventing their recurrence.

He reports four cases, in the first of which a stone formed after a long period of infection. The affected kidney was removed and this was followed by a formation of stone and infection of the remaining kidney about a year later, it having been entirely free of stone and infection previous to nephrectomy.

In the second case the stone was found in an infected kidney, the other kidney being free. Removal of the stone and drainage of the kidney was followed by infection and stone formation in the opposite kidney in a month, the drained kidney returning to normal.

The third case showed rapid formation of stone in various parts of the urinary tract on both sides. This patient had a horse-shoe kidney.

The fourth case had two recurrences in the same location following two pyelotomies.

Cathelin, F.: Calculi in Immobilized and Well-Fed Patients with Genito-Urinary Infected Wounds (Les pierres des immobilisés et des bien nourris chez les blessés infectés de l'appareil urinaire). *Rev. gén. de clin. et de thérap.*, Par., 1918, xxxii, 481.

In at least 10 cases of men suffering from fistulæ, the result of genito-urinary wounds, in which a long stay in bed was necessary, Cathelin noticed at the end of their hospitalization a particular syndrome consisting of the sudden appearance of signs of unilateral renal retention with nephritic symptoms, generally accompanied by some fever and a bad general state. This condition lasted from eight days to three weeks until the expulsion of calculi accompanied by a purulent discharge. There was nothing in the history of these patients to indicate lithiasis.

As a matter of fact, the patients are more or less infected by the genito-urinary tract; but the occur-

rence of the calculi is not due to this cause. Cathelin says that the origin of the calculi must be sought in the long period of immobilization; that the men indulged heavily in mineralized food, without useful exercise, and that consequently there is an absence of cellular functioning and a good combustion. Thus there is a retention of mineral matter which leads to the formation of calculi. W. A. BRENNAN.

Hirose, K.: The Blood-Pressure in Amyloid Disease of the Kidney. *Bull. Johns Hopkins Hosp.*, 1918, xxix, 191.

Since the time of Rokitansky so many have studied the influence of amyloid disease of the kidney upon the blood tension that it might appear that little remained to be done. Nevertheless, at the suggestion of Welch, the following attempt has been made by Hirose to ascertain: (1) whether amyloid ever occurs in the kidney without nephritis; (2) what types of nephritis are associated with amyloid; and (3) what changes in the blood-pressure and in the condition of the heart and arteries accompany amyloid disease of the kidney.

The material employed in this study comprised 87 cases of amyloid disease collected in the pathological departments of the Johns Hopkins University and Bay View Hospitals; 59 of these showed definite amyloid changes in the kidneys. Sections were stained by the various well-known methods and the cases analyzed and tabulated to show the condition of the kidneys, heart, and other organs as well as the state of the blood-pressure and other clinical conditions.

From the analysis of the cases it was found that tuberculosis occurred in 28 and syphilis in 22. Other chronic infections were also found often in connection with these, so that the cause of amyloid disease cannot be regarded as simple.

Thirty-two cases were male and 27 female. Fehr reports 89 cases in males and 63 in females. With regard to age, it was found that most of the cases died in the third decade.

The excess of deaths with amyloid diseases in the third decade is probably due to the fact that tuberculosis is so common in persons of that age. It is striking that of the 59 cases, 26 were negroes, in spite of the fact that more white than negroes were treated in the hospital.

The study may be thus summarized:

1. In a series of 59 cases the presence of amyloid in the kidneys has always been associated with chronic nephritis. It is impossible to determine whether the nephritis antedated the amyloid or was developed coincidentally with it. In 40 cases in which measurements were given, the kidneys were larger than normal, while in nine they were small and granular.

2. In all but one of the 15 cases in which the blood-pressure was recorded, it was found to be normal or below normal. In the one case in which the systolic pressure was 170 mm., the kidneys were large and there was no cardiac hypertrophy.

3. Of the 59 cases, 10 showed cardiac hypertrophy but only one of these were associated with small granular kidneys, and in none was high arterial tension noted.

It appears that, even if it be assumed that a persistent nephritis produced cardiac hypertrophy and hypertension, the advent of the amyloid-forming process must have reduced the blood-pressure to a low point and may even have caused a retrogression in the size of the heart. GEORGE E. BEILBY.

Mason, J. M.: The Management of Subparietal Injuries of the Kidney. *Surg., Gynec. & Obst.*, 1918, xxvii, 277.

The author claims that while gunshot and stab wounds of the kidney usually receive immediate surgical treatment on account of profuse hæmorrhage, the concealed or subparietal injury to the kidney often remains under medical care until grave symptoms demand surgical consultation. This is often to the great detriment of the patient, who should be under surgical care from the beginning.

Any trauma which is followed by hæmaturia should cause the patient to be kept perfectly quiet and under constant observation until the nature of the injury can be determined. If hæmorrhage is associated with collapse, pain, tenderness, or tumor in the region of the kidney, it indicates serious injury to that organ.

Subparietal injuries may consist of contusions, slight lacerations of kidney substance, or complete rupture of the organ. The kidney alone may be damaged, or there may be complicating injuries to another organ or structure of the body. In deciding on a plan of treatment, due allowance must be made for any complicating injury present.

Treatment consists of expectant or non-operative treatment, early exploration, or late operation.

Expectant treatment is not advised, as the author considers it unsurgical, unsafe, and illogical; and, according to Watson, Neilson and others, it is attended by the highest mortality of any of the above plans.

Early exploration he considers to be indicated in every case unless severe shock or complicating injuries demand delay. Late operation is for those cases which are not seen early, or where complications have made it inadvisable to operate earlier. Late operation robs the surgeon of the opportunity of such conservative work on the kidney as might have been carried out by earlier exploration; for in delayed cases infection has been usually added to the original injury, making nephrectomy necessary where suture, packing, or resection might have been employed earlier.

He summarizes the advantages of early exploration as follows:

1. The danger of exploration in properly handled cases is slight, and is not to be compared to that of expectant treatment.

2. The nature and extent of the injury may be definitely and promptly determined.

3. Appropriate measures may be employed without delay for the control of hæmorrhage, to guard against infection and to provide for drainage.

4. In certain favorable cases suture of the ruptured kidney may be successfully carried out, while in other instances the kidney may be saved by packing and draining.

5. A hopelessly damaged kidney may be promptly removed, thereby shortening convalescense and restoring the patient to health in the briefest possible time.

The author reports three cases. The first was contusion or slight laceration of the right kidney due to a fall. This case was complicated by fractured ribs, a fracture of the neck of the left femur, and fracture of the right iliac crest. These complications prevented exploration of the injured kidney. Hæmaturia and other symptoms disappeared at the end of four days and the patient recovered without operation.

The second case was rupture of the right kidney due to a fall from a train. Death from shock and hæmorrhage occurred on the afternoon following the injury, while preparations were under way for operation.

The third case was rupture of the left kidney; the patient had been struck by an automobile. This patient was seen on the sixth day following the injury. She had pain, tenderness, and tumor over the left kidney, a temperature of 102.5°, and hæmaturia. The kidney was found deeply lacerated in two directions. Nephrectomy was done and recovery followed.

In each case the source of the hæmaturia and the presence of a second functionating kidney was demonstrated by the cystoscope.

In all cases gas-oxygen anæsthesia was employed.

Frothingham, C.: Studies of Renal Function During and Immediately Following Some of the Acute Infectious Diseases. *Arch. Int. Med* 1918, xxii, 74.

The author calls attention to the fact that during almost any of the acute infectious diseases definite anatomic lesions of the kidney may occur. These lesions are usually associated with certain clinical signs, such as œdema, scanty urine, albumin in the urine, and abnormal findings in the sediment. It has been shown by Schwartz amd McGill that the renal function as studied by various special tests is much impaired in these cases.

During the course of acute infections certain cases fail to show any evidence of renal disturbance by the usual routine examination of the urine. The question arises as to whether or not these cases without apparent renal involvement would show any disturbance in renal function by the special tests more recently devised for the purpose, either during the febrile period or soon after.

As bearing on this question the author reports his findings in a series of cases studied in the Medical Clinic of the Peter Bent Brigham Hospital. The tests used were the phenolsulphonephthalein test of Rowntree and Geraghty, the estimation of blood urea by the method of Van Slyke and Cullen, and the determination of McLean's index of urea excretion.

The renal function was determined during and just after an acute infection. Cases were selected among young people who presented no evidence of chronic nephritis and no evidence of acute nephritis as sought for by the usual urinary studies. Usually all the tests were performed on the same day.

The results of this study are grouped by diseases and recorded in tables with an accompanying discussion of the findings. These groups include typhoid fever, pneumonia type one, pneumonia type four, acute articular rheumatism, and a miscellaneous group made up of a variety of diseases such as gonorrhœal arthritis, abscess of the periosteum, acute gout, cervical adenitis, and bronchopneumonia.

For a detailed discussion of the findings in these cases one must consult the original paper. As a general conclusion, the author states that the renal functional tests employed failed to show consistent evidence of impaired function, during the course of or following these acute infections in which the clinical picture or the urinary examination by the older methods showed nothing suggestive of acute nephritis. H. A. FOWLER.

Schrup, J. H.: A Simple Method of Estimating the Indigo-Carmine Output. *Am. J. Surg.*, 1918, xxxii, 171.

Urine is collected for a specified time, and diluted to one liter.

An amount of indigo-carmine equal to that used in the test is dissolved in ordinary water and diluted to one liter. An undiluted portion of this makes a 100 per cent control; one-half strength 50 per cent, and so on.

The phenolnephthalein test requires a corresponding dilution.

The same principle of dilution and control can also be used in a colorimetric determination of other substances. THEO. DROZDOWITZ.

BLADDER, URETHRA, AND PENIS

Hunner, G. L.: Elusive Ulcer of the Bladder; Further Notes on a Rare Type of Bladder Ulcer, with a Report of 25 Cases. *Am. J. Obst.*, N. Y., 1918, lxxviii, 199.

These ulcer areas are always small, usually measuring not more than 5 mm. in diameter. They may be linear and measure from 0.5 to 2 cm. in length and from 1 to 2 mm. in width, and may thus resemble the mouse-eaten linear ulcer not infrequently found in a tuberculous bladder. Two or three minute ulcers may be found in a group and they may be surrounded by a small red area of œdema. The ulcers always appear to be superficial. The

bimanual palpation before cystoscopy may cause the ulcer to bleed, as may the splitting of the surface when the air distends the bladder if the patient is examined in the knee-breast posture. Hence one may catheterize macroscopically clear urine at the beginning of the examination and be surprised to find bloody urine in the bladder immediately afterward on doing cystoscopy.

The ulcer area may or may not be surrounded by a zone of radially converging vessels. One may find a minute ulcer with or without œdema around it, and in another portion of the mucosa an œdema area without an appreciable ulcer. These œdema areas are generally seen immediately after the patient has been having an unusually bad period of bladder symptoms with much strangury.

The cause of this type of bladder inflammation remains a mystery. The chief symptom associated with it is pain. Associated with the pain, the other symptoms of cystitis occur in varying degree, namely, frequency day and night, strangury, burning and smarting.

From his experience, the author believes that no form of treatment will suffice in these cases except complete excision of the inflammatory area. The excision is done through a suprapubic incision. To facilitate the finding and handling of the bladder, it is left full of air if cystoscopy has just been done in the knee-breast posture, or it is distended with sterile fluid just before operation. If possible, the operation is kept extraperitoneal.

After excision of the diseased area, the bladder is closed by bringing the edges together with combination interrupted and whipped sutures of twenty-day formaldehyde catgut No. 2, leaving a slight opening in the vertex through which the mushroom retention catheter is carried and sutured to the bladder wall with a No. 2 ten-day catgut. The first sweep with the interrupted portion of each suture takes in all coats of the bladder wall, and the second sweep or whipped portion of the suture buttresses in the outer more mobile coats of the bladder. The abdominal wall is closed except for a small opening to carry the rubber catheter and two cigarette drains, which are introduced down to the bladder wall.

EDWARD L. CORNELL.

Guthrie, J.: An Operation for Reconstruction of the Urethra in Cases of Severe or Impermeable Stricture. *Brit. M. J.*, 1918, ii, 111.

The author reports three cases of this operation, which gave excellent results. The operation was first performed by Hochrein of Chicago and consists in closing the defects in the urethra, after cutting away all of the scar tissues, by a long pedunculated flap of dartos, the introduction of an ordinary catheter, and the stretching of the dartos and skin over the defect in the urethra. The tube was left in for two or three weeks, then removed, and the author states he passed a 17 bougie six months after the operation. Seven months after the operation the patient passed a renal stone.

The author believes the flap operation is easier to perform and a great deal more satisfactory than the grafting operation. There is no doubt in his mind that the urethral epithelium rapidly grows from the strip left in the roof of the urethra and covers the entire surface of the dartos flap.

V. D. LESPINASSE.

Young, H. H.: A New Operation for Epispadias. *J. Urol.*, 1918, ii, 237.

Most operative procedures advocated in the treatment of hypospadias or epispadias have not given the results desired in the majority of cases. Cantwell's method of treating epispadias by building an urethral tube from the gutter-like groove on the dorsum of the penis, bringing together the inner edges formed by two longitudinal incisions on either side of the groove and then dissecting this newly-formed urethra free, has been the most popular.

Young has recently developed an operation somewhat different from Cantwell's, the technique of which is graphically shown. The case described was one that required a procedure involving the separation of the corpora cavernosa with transplantation of the new urethra. In so doing it was evident that the most important thing was to preserve the blood supply of the skin transplant which was left attached by a broad connection along its entire length to the left of the corpus cavernosum, and then rotating this structure with the new urethra so as to displace the latter to its new position beneath the corpora.

The transplantation was successfully accomplished. The corpora were well separated so that they were held together only by the skin on the under surface of the penis. A very deep groove to be occupied by the urethra was thus produced. The left corpus had been sufficiently mobilized to allow it to be rotated, carrying with it the urethral graft. To close over the roof of the urethra, a continuous chromic catgut suture was used. The newly formed urethra, by this method, is shifted into position beneath the corpora cavernosa by bringing together the two corpora above it, using interrupted sutures of chromic catgut.

The operation is completed by a dorsal line of sutures bringing together the two halves of the glans, and approximating the skin edges along the dorsum of the penis. Young has performed this operation twice and in both cases the results were excellent.

H. W. E. WALTHER.

GENITAL ORGANS

Woodruff, S. R.: The Prostate Question. *J. M. Soc. N. J.*, 1918, xv, 263.

The author discusses the question from the viewpoint of the necessity for operation, the diagnosis, the differentiation of diverticulum, tumor, tabetic bladder or calculi; and the necessity of cysto-urethroscopy. Exclusion of carcinoma is mostly by the character of the rectal touch. The characteristic peculiarly stony, flat, fan-shaped mass, generally

smaller than the usually enlarged gland, is a more definite means for conclusion than hæmorrhage or residual urine.

A serious menace to successful termination of a case is a large amount of residual urine, even if uninfected. It means a dilated atonic bladder, dilated ureters with some hydronephrosis, compression, and absorption.

Pre-operative treatment consists of urea nitrogen, uric acid and creatinin for retention; phenolsulphonephthalein in frequent tests for the variance of renal function from time to time. The author considers over 5 mg. of creatinin per 100 ccm. and less than 25 per cent for two-hour phthalein output as very grave.

Hygienic and dietary measures, and removal of residual urine and cystitis by daily catheterization, the indwelling catheter or suprapubic cystotomy with irrigations, prepare the patient for enucleation.

The two-stage operation is a procedure of necessity. The method of enucleation by suprapubic or perineal route is merely a question of the personal equation.

H. W. PLAGGEMEYER.

Cumston, C. G.: A Note on the Treatment of Wounds of the Genital Organs in Warfare. *Ann. Surg.*, Phila., 1918, lxviii, 306.

Wounds of the scrotum and testicle by missiles are on the whole relatively frequent. There may be merely a single contusion of the scrotum, giving rise to a hæmatoma, or traumatic orchitis, with or without lesions of the urethra or hernia of the testicle.

As to the seminal gland, it may be simply contused, or partially or totally destroyed. The vas deferens may be contused or divided.

The symptoms are not usually very marked. Hernia of the testicle may be primary or secondary.

There is one point which merits particular attention, i.e., death may occur from infections, complications, or from associated lesions where hernia of the testicle arises. Three eventualities are to be looked for: (1) the organ may slough, (2) become reduced spontaneously, and (3) become grafted on a neighboring area.

When the testicle is injured to an extent beyond repair, castration must be done, but it should not be forgotten that repair may take place. There is a rule in these cases which never suffers an exception, namely, that conservative surgery must be foremost.

For contusion of the scrotum, the treatment is usually moist humid dressings. A hæmatoma of the scrotum or an hæmatocele would call for incision and drainage.

If a missile or other foreign body is lodged in the scrotal cavity, it should be removed at once, but the treatment becomes a much more delicate question when the testicle is involved. Not uncommonly the gland, be it either intact or injured, forms a hernia through the aperture in the scrotum. The only rational treatment is its reduction into the bursa and suture of the latter. The reduction may be delayed for a few days until the scrotal wound has been properly cleansed if it appears to be infected, as is usually the case, but at the same time the vitality of the testicle must be carefully watched.

There is every reason to attempt reduction, even when the testicle is contused or offers a superficial wound. The parenchyma forming the hernia should be carefully reduced and the albuginea minutely sutured. One can never surmise just what this conservative treatment may hold in surprise, but the great value of the organ in question cannot but incite one to attempt conservative treatment.

When considering the question of castration for any motive whatsoever, account should be taken of the condition of the fellow organ which may in its turn be compromised in the injury.

Wounds of the vas deferens are sutured in case of division, but as yet the ultimate outcome of these patients is unknown.

As to retention of urine of reflex nature, a few applications of aseptic catheterization will generally control the situation. Suprapubic cystotomy should be done for retention of urine following an injury to the urethra, and a few days later the urethra can be repaired by some of the many methods at disposal.

THEO. DROZDOWITZ.

MISCELLANEOUS

Krotoszyner, M.: A Plea for a Complete Urological Diagnosis at One Sitting. *Calif. St. J. Med.*, 1918, xvi, 378.

The author decries the performance of several tests repeatedly done at different cystoscopic sittings and describes the conditons for a routine single cystoscopic examination. He discusses the advantages for determination of undisturbed renal activity; the feasibility of the injections; and the trustworthy deductions as regards renal sufficiency and insufficiency.

In a tabulation for the purpose of group comparison in case groups of equal numbers, a ratio of comparative values of urea, phloridzin, and phenolsulphonephthalein, and the discrepancies encountered, is made. Six comprehensive table groups are given which determine the coincidence and the ratio of parallelism in percentages, unilaterally and bilaterally.

The author describes the single sitting in sequence. The blood urea having been taken, the intravenous indigocarmine injection is made at the start of the cystoscopy. Bladder examination and observation of appearance time of the dye from the orifices is followed by ureteral catheterization with bilateral collection of the urines. Two ccm. of 0.5 per cent phloridzin solution now injected are collected in two test tubes containing heated Fehling's solution, by separate observers. The cystoscope being removed, the patient is transferred to the X-ray room. The sugar collection is here terminated and gravity thorium-pyelography performed.

For the qualitative indigocarmine and quantitative phloridzin and urea tests, 5 ccm. of urine specimens suffice. The entire sitting is carried out in about one hour.

H. W. PLAGGEMEYER.

Walther, H. W. E.: A Flexible Metallic Ureteral Sound with Filiform Guide. *J. Urol.*, 1918, ii, 253.

All physicians who do any amount of ureteral catheterization and sounding encounter cases in which it is impossible to introduce ordinary sized ureteral catheters into the ureter for any distance. That it is very important at times to establish whether or no the ureter is patent is obvious.

Walther describes a new flexible metallic ureteral sound with filiform guide which has proven successful when other instruments fail. Adopting the principle Le Fort introduced by his flexible silk filiforms with metal sound followers, Walther had constructed a flexible metallic ureteral sound, the length of an ureteral catheter, with a semi-olivary tip of the size 11 Charriere, the extremity of the tip being a screw-thread projection to join to any ordinary Le Fort filiform. The shaft of the ureteral sound, being flexible, has all the resiliency of any catheter, with the added advantage that it posseses infinitely more rigidity.

In ureteral stricture or other obstruction in the ureter, this instrument has been of value. The technique employed in passing this sound is simple. With the operating cystoscope in a water-distended bladder, the filiform guide, firmly screwed to the flexible sound, is fed into the catheter channel of the cystoscope. After the filiform enters the bladder, catheterization is attempted in the usual way. Naturally, the finer the tip of the filiform, the more readily one is apt to get through the ureteral stricture or other obstruction.

Walther has found the Le Fort filiforms much firmer in consistency than the usual ureteral filiforms now in use. By manipulating the filiform with a cork-screw motion, one will frequently succeed in getting through even the most severe type of stricture when passage up the ureter could not be accomplished in any other way. Once the filiform passes the narrow point, the instrument can then be pushed up until the olivary tip engages the stricture, dilating the same to 11 Charriere.

Maidagan, J. M.: Urinary Calculi in Infancy (Lithiasis urinaria en la infancia). *Rev. méd. d. Rosario*, 1918, viii, 273.

Urinary calculi in young children are not often observed in South America. In Buenos Aires Vegas in 25,000 examinations observed only 4 cases, 2 of the urethra, 1 of the bladder, and 1 of the kidney. In the Children's Hospital in the same city during the past twelve years 18 cases were observed.

In the author's personal statistics of 12 years' practice at Rosario he has seen 9 cases of urinary calculi in children: 3 in the bladder (2 operated upon); 1 in the anterior urethra; 4 preputial; and 1 in the ureter.

The author reviews the etiology. The symptomatology observed in children is like that seen in adults. In treatment surgery may be indicated for vesical calculi. The usual procedures for the adult are suitable for the child, viz., perineal or suprapubic section, lithotrity, etc. Suprapubic cystotomy, with total closure of the bladder, is the method of choice for the child and should be done immediately after a diagnosis of calculus is made. The high position of the bladder during early childhood, more abdominal than pelvic, facilitates the section. It is unnecessary to have recourse to Petersen's rectal balloon; and in order to operate with ease it is necessary only to distend the bladder partly with from 60 to 100 grams of sterilized water.

The author gives the full details of two cases of bladder calculi in which he operated by the suprapubic route. In the first, a boy of four years, a calculus 5 cm. by 3 cm. in size and weighing 19 gm. was extracted. In the second case, a boy of ten years, the symptoms suggested a calculus in the left ureter. On operation the stone could not be found. It was believed to have migrated to the bladder during the manipulations. This was shown afterwards to be the case. The wound was therefore closed. Both cases made good recoveries.

W. A. Brennan.

Macht, D. I.: The Absorption of Drugs and Poisons from the Bladder and the Urethra; Absorption of Various Alkaloids, Antiseptics, Local Anæsthetics and Salts. *J. Urol.*, 1918, ii, 211.

In a previous communication, Macht recorded his observations on the absorption of morphine and apomorphine from the bladder and the urethra, and now undertakes the study of a large number of pharmacological agents from the same organs.

The drugs investigated were atropine, pilocarpine, nicotine, acontine, epinephrin, phenol, creosol, cocaine, and alypin.

The results were that a large number of drugs and poisons can be and are absorbed from the urethra. The absorptive power of the bladder is very poor as compared with that of the urethra, which agrees with clinical findings. This holds good not only in the case of the male, but also in the female.

Louis Gross.

SURGERY OF THE EYE AND EAR

EYE

Byers, W. G.: The Diagnosis of Inflammations of the Uveal Tract of Systemic Origin. *Canad. M. Ass. J.*, 1918, viii, 593.

The author does not speak of the ordinary signs upon which the diagnosis of uveal tract inflammations are made *per se;* nor of any special changes that are supposed to take place in special infections. He confines himself to the aspect of diagnosis which has to do with the determination of the causes of the uveal inflammations of systemic origin. He would have the reader understand the term "uveal" to cover any and all divisions of the vascular tunics of the eye, namely, the iris, ciliary body, and choroid.

Theoretically it is stated that the subject in general belongs very properly to the internist, but since the oculist is the recipient of most of the work in this field, it has been very properly investigated by him, as reports from various sources testify.

Of the old etiological factors causing uveitis, only two remain, syphilis and tuberculosis, and these have their relative importance more clearly defined. While others, with a connection still existing, have their relationship to ocular disturbance explained in quite a different manner than formerly. As for instance, but a short time ago chronic rheumatism was regarded as one of the well-known causes of uveitis, while today chronic rheumatism in its protean dress is looked upon as largely if not entirely symptomatic of focal infections that are also the cause of ocular manifestations of disease. Since the pathologists have refused to accept a non-bacterial origin for inflammation, it has placed many affections in a different light. Anæmia is no longer regarded as a causative factor, but a predisposing influence, as occasioned by infection. Likewise diabetes and gout have been brought into question as to the direct part played by them, and so with other conditions.

Citation is made of the work of Irons and Brown, based upon a study of 100 cases of iritis, in which every modern research was brought to bear upon the elucidation of the etiology.

He divided cases of uveitis into four classes:

Class 1. (45 cases): In which a single factor was isolated as the cause of the uveitis.

Class 2. (37 cases): In which, though several possible single etiological factors were determined, the investigators were able to say after a careful weighing of all the evidence that one only was responsible for the uveitis.

Class 3. (17 cases): In which several possible etiological factors were demonstrated, but it was impossible to throw the onus upon any single one.

Class 5. (1 case): In which it was not possible to ascertain the cause.

By adding the figures of classes 1 and 2 together, there may be obtained percentage data regarding the etiology of uveitis that are striking in comparison with those still found in current works on ophthalmology, though this work of Irons and Brown was not intended primarily to bring out these points. In this connection it is shown that syphilis, accorded by some authors a place as high as 90 per cent, is given a percentage of but 23 in this series of cases. Focal infection, rightly including, according to the author, gonorrhœa, accounts for 51 per cent of the cases. Another illuminating fact is that of the total of 51 cases of focal infection, the teeth, tonsils, and sinuses alone were responsible for 37. Tuberculosis, with 8 cases, shows its etiological importance.

The author speaks of the necessity of routine examinations in these cases of uveitis and the desirability of team work to be obtained where all the various necessary tests may be made for a proper diagnosis. He warns against that sort of association in which a practitioner jealously maintains control and presents one with preconceived ideas rather than carefully established facts. It is urged that the profession should not evade definite routine examinations, even though it entails considerable outlay of time and money both for the physician and the patient. Where the matter is fully explained, the author finds no difficulty in securing the cooperation of the patient. The fact that in a series of 100 cases examined by Irons and Brown, only 1 per cent could not be definitely tabulated as to etiology, speaks well for the necessary pains to be taken and the good results for the patient.

Some standardization is needed in making these examinations, and it is suggested that the following, in the order mentioned, should be the minimum required:

1. A thorough bodily examination by the internist or practitioner, including inspection of the fæces, urinalysis and blood examination. Attempt to get a clear history as an aid in establishing the relationship between the ocular disease and some one of the known etiological possibilities. Bacteriological examinations of the secretions from suspected foci, of the aqueous humor, not alone for diagnostic purposes but also for the possibility of securing valuable autogenous vaccines.

2. A Wassermann test. Because of the very important rôle played by syphilis in disease of the uveal tract, this examination is necessary. Never let the social position of the patient interfere with this test. On the other hand, a negative Wassermann may be contradicted by a striking improvement under anti-syphilitic treatment. To get a satis-

factory Wassermann reaction the following precautions are necessary: first, blood must be taken directly from the vessels, avoiding the skin (subcutaneous fat), and not by blister or cupping; second, blood should never be taken (a) after a meal; (b) during fever; (c) during any acute infectious disease; (d) during suppurations or resorptions of large inflammatory exudates, pneumonia, empyema, etc., or even in ulcerating or necrosing tumors; (e) after narcosis. Finally, a negative Wassermann does not necessarily exclude syphilis.

3. Examinations of the nose and accessory sinuses, the throat, and the teeth by specialists to supplement that by the general practitioner.

The author thinks it strange that the appreciation of the possibilities of infection from these fields was not earlier, in view of the possibilities and opportunities for bacterial development in the crypts of tonsils and adenoids, in the crevices and pockets about decaying teeth, and especially the deep-seated alveolar abscesses that lie dormant to the various cavities adjacent to the nose and connected therewith, often so imperfectly drained and prone to closure; and also the intimate connections of these parts with their blood-vessels, and especially of the lymph-vessels of the head and of the chest. The richness and virulency of the bacterial flora of these parts has been known for some considerable time.

Of the three fields under discussion, it is acknowledged that the nose and accessory sinuses present the greatest difficulty in making a satisfactory examination and diagnosis. The X-ray plate should be used as a means of revealing some disease of the nasal accessory sinuses; it will also show the condition of the teeth and the presence or absence of alveolar abscesses. Exploration of the sinuses may be necessary. The sphenoid is cited as frequently being the cause of uveal inflammation.

The author concludes: "It should be of importance in these investigations to seek out all the causes that tend to lower the natural combative forces of the body. The great majority of people carry foci of infection, yet only a small percentage develop metastases. It is in moments of lessened resistance that bacterial processes extend. Following these lines our problem leads us into the broad fields of preventive medicine, the aim of which is to help man by placing him in a better moral and physical environment." J. S. CLARK.

Pagenstecher, A. H.: Opticociliary Neurotomy, Resection of the Optic Nerve; a Substitute for Enucleation. *Arch. Ophth.*, 1918, xlvii, 409.

This resection of the optic nerve, which was done over 100 times at the author's hospital between 1898 and 1913, is indicated in two groups of cases: first, cases of absolute glaucoma with great pain; and second, cases of total staphyloma where the formation has not advanced to the point of causing great deformity.

Intra-ocular tension is reduced and pain is relieved.

In cases of injury where enucleation was not permitted, the resection of a large piece of the optic nerve was done, believing that hereby a definite prevention of sympathetic inflammation was obtained; and especially if the injury was a penetrating one, the eyeball shrunk and formed an excellent cushion for an artificial eye.

The author wishes to correct the impression that the operation is a difficult one. The method of operating is that ordinarily described, except that it is not considered necessary to resect the muscles; and if no pronounced bleeding occurs, the after-treatment is not longer than follows simple enucleation.

S. S. HOWE.

Stevens, G. T.: Righthandedness in Its Relation to Visual Conditions. *N. Y. M. J.*, 1918, cviii, 269.

The manner in which righthandedness influences vision is explained by the fact that the anterior part of the left hemisphere, which is the cerebral location for the control of the movements of the right arm and hand, is more developed than the corresponding part of the right hemisphere. This in turn produces a corresponding enlargement of the cranium on the left side anteriorly, and a modification of the position of the orbit naturally results from this unequal development of the two sides of the cranium.

The upper arch of the orbit is pushed outward and the axis of the cavity changed from a vertical to an oblique direction. The globe of the eye is thereby tilted, its vertical meridian leaning outward toward the temple, and thus from these leanings is vision affected because of the disharmony of action of the two eyes preventing the reception of simultaneous impressions on exact corresponding points of the two retinæ in any position,—the prerequisite of binocular vision. The degree of visual confusion from inharmonious adjustments of the two retinæ would depend largely upon the degree of the deviation of the meridians from the normal and also upon the physical ability of the subject of the anomaly to make the nearest approximate adjustments. Any conditions of imperfect adjustment of the eyes may work greatly to the disadvantage or to the dulling of vision.

In conclusion, the author advises discouragement of the custom of righthandedness; also of lefthandedness. The aim of the instruction of the child should be the greatest efficiency in both hands while preventing the exclusive use of either.

OTTO M. ROTT.

EAR

Callahan, J. F.: A Hearing Test to Detect Malingering. *Boston M. & S. J.*, 1918, clxxix, 236.

The author's test is based on the fact that tuning forks vibrating with the same pitch and loudness one inch from each ear are heard in each ear, but that if the fork at the left ear is removed to a point three inches from the ear, this sound is lost and

only the fork remaining one inch from the right ear is heard. If now the one at the right ear is removed six inches from the ear, it will no longer be heard; but the left one, formerly not heard, will again become audible. Similar results were obtained if the fork was placed against a rubber tubing.

For this test the author uses a seven-foot length of rubber tubing, the hole 3/16 of an inch, the diameter of the wall of tubing 6/16 of an inch, to either end of which is attached an aluminum funnel. The funnels are held to the ears and about one inch away from them by a simple attachment on the headrest of the examining chair, which allows of their adjustment to cover the ears without touching the patient.

The 256 C 1 fork is heard by the normal ear, when placed against the tubing at any point up to seven and one-half feet. With a larger sized tubing the fork is heard as far away as thirty feet.

The application and results in an individual with two normal ears are as follows: The seven-foot tube is connected with one funnel, the latter being placed about one inch from the right ear. The tuning fork vibrating is applied to the tube about six inches from the ear and moved along the tube away from the ear until it is no longer heard. This will usually be about seven to seven and one-half feet. The tube is now disconnected from the right funnel and attached to the left, and the same procedure followed. If normal, the left ear will also hear the sound of the fork transmitted along the tube up to seven feet or more from the ear.

The tube is now attached to both funnels. The vibrating fork is applied to the tube one foot from the right ear and moved along the tube away from the right ear and toward the left ear. It will be heard only in the right ear until it reaches a point about three to three and one-half feet from the right ear, at which point it will be heard also in the left ear and will continue to be heard in both ears for a distance of about four inches in the middle of the seven-foot tube.

It is this space of about four to six inches in the middle of the tube that the author calls the "neutral space." The sound in this neutral space almost imperceptibly disappears from one ear to appear in the other, and in this space there is some doubt in the patient's mind as to which ear hears the fork. As the neutral space is passed through, the sound becomes perceptible in the left ear and is not heard in the right. It is to be noted that whereas the right ear heard the tuning fork up to seven feet in the first part of the test, it is now loses the sound of it along the same tubing at about three and one-half feet because in this second instance the other end of the tubing goes to the left ear, and as the tuning fork passes from the right half of the tubing through the neutral space to the left half of the tubing, the sound is heard in the left ear alone. The detection of feigning now becomes practicable if it takes the form of misstatements concerning the hearing in one ear.

The detection of malingering is illustrated by the following case in which total deafness in the right ear was claimed:

With the long "one ear" tube connected for his left ear it was found on several tests that he heard the fork up to seven and one-half feet from the ear. With the same tubing connected with the funnel for the right ear he persistently held that he did not hear it even at four inches from the ear. The tube was then connected with both funnels and the tuning fork started at the good left ear. He admitted hearing the sound in the left ear until a point forty inches from the left ear was reached when he said that he could not hear it. From this point onward up to four inches from his bad right ear he claimed not to hear the sound.

The tuning fork was then placed over the coupling in the tube, this point being fourteen inches from his right ear and seventy inches from his left. He said he did not hear it. The coupling was taken apart and the fork again touched to the tube at the same place where he had just said he heard nothing at 70 inches from the left ear on the end that went to the left ear, and he said he heard it in his left ear.

He was caught, for if his right ear had been deaf, he would have heard the sound in his left ear at this point and at every other point up to 84 inches from his left ear while the tubing was still connected with both funnels. He reported not hearing the sound to the right of the neutral space because he was determined to give a negative answer whenever he heard the sound in his right ear.

OTTO M. ROTT.

Lathrope, G. H.: Acute Mastoiditis as a Complication of Infectious Diseases, Based on a Study of 123 Cases in the Base Hospital, Camp Shelby, Miss. *J. Am. M. Ass.*, 1918, lxxi, 451.

In this study the author presents facts and analogies from which he draws the following conclusions:

1. The army camp in question experienced during the past winter an epidemic of acute mastoiditis.

2. This exhibition of mastoid infection is only one expression of the general streptococcus incidence in the camp.

3. The latter streptococcus invasion, in turn, is but one phase of the very widespread wave of streptococcus disease throughout southern army camps.

4. It is peculiar in two points: (a) The dominant organism is the streptococcus viridans, and not a hæmolyzing streptococcus, as appeared elsewhere; and (b) its chief expression is in the form of an unusually severe involvement of middle ear and mastoid tissues.

5. Measles played a prominent part in giving the streptococcus a start, and stands as an etiologic factor in the development of the severer types of mastoiditis.

OTTO M. ROTT.

SURGERY OF THE NOSE, THROAT, AND MOUTH

NOSE

Stephenson, S.: Cases of Acute Anterior Ethmoiditis in Young Subjects. *Brit. J. Ophth.*, 1918, ii, 416.

The author reports ten cases of orbital inflammation or suppuration due to an acute inflammation of the anterior ethmoid cells and he believes that many such cases are overlooked, inasmuch as the symptoms are so mild.

His conclusions are:

1. In young subjects, usually under five years of age, a form of orbital inflammation or suppuration is not infrequent.
2. The condition is always unilateral.
3. There are clinical grounds for believing that an acute inflammation of the anterior ethmoidal cells is the primary condition.
4. The prognosis is good, since the condition undergoes resolution often without surgical intervention.

OTTO M. ROTT.

THROAT

Ajello, A.: Primary Sarcoma of the Right Faucial Tonsil Operated upon by the Laterocervical Route; Recovery (Sarcoma primitivo della tonsilla palatina destra operato per via latero-cervicale; guarigione). *Riforma med.*, Napoli, 1918, xxxiv, 506.

The author's case was in a man aged sixty-seven years, who came to him for treatment seven years ago. Examination showed that the pharyngeal swelling of which the patient complained was a tumor having its origin in the right faucial tonsil. From the clinical and histological findings a diagnosis could be made of primary small-celled sarcoma of the right faucial tonsil with probable metastases to the cervical lymphatic glands. An immediate operation was done.

A modified Kroenlein incision was made starting from the apex of the mastoid process, descending and crossing the sternocleidomastoid muscle, then upward and ending at the lower margin of the jaw about 3 cm. from the symphysis of the chin.

The aponeurosis along the sternocleidomastoid muscle was incised and the external carotid isolated, as well as other important vessels. With an assistant placing a finger in the patient's mouth and pushing the tumor toward the opening, the operator was able to locate its limits, pull it into the opening and enucleate it, after some preliminary difficulties to secure perfect hæmostasis before opening the pharynx. The swollen glands were resected.

The postoperative course was regular. The patient has been under the author's constant supervision for the past seven years. He continues to enjoy good health and there are no signs of recurrence.

The anatomic diagnosis made from the extirpated tumor in every way confirms the clinical diagnosis. The extirpated glands also showed rich leucocytic infiltration, with adhesive peri-adenitis.

Primary sarcoma of the tonsils is very rare. Only about 40 cases have been recorded in literature.

W. A. BRENNAN.

Loeb, H. W.: The Susceptibility to Infection Manifested by the Remains of Incompletely Removed Tonsils. *Ann. Otol., Rhinol. & Laryngol.*, 1918, xxvii, 103.

The author reports five cases in which small stumps of tonsils became infected and caused similar local and general manifestations to infections of the entire tonsil. These cases present a decisive argument against any form of operation which does not contemplate the entire removal of the tonsil, especially where there have already been some infective processes originating in the tonsil. These cases also suggest, in the author's opinion, the advisability of following up cases of tonsillectomy to determine whether any portion remains and whether it has become a focus of infection.

OTTO M. ROTT.

Arrowsmith, H.: The Treatment of New-Growths of the Larynx by Internal Surgical Methods. *N. Y. St. J. Med.*, 1918, xviii, 368.

The author traces the development of internal surgery of the larynx from its earliest days to the present, and concludes that although internal surgery according to one plan or the other is entirely adequate to deal with all but the most exceptional instances of benign laryngeal tumors, it is entirely inadequate if not dangerous to attempt the removal of a malignant neoplasm by this method.

OTTO M. ROTT.

Lubman, M.: Prevention Versus Treatment in Tuberculous Laryngitis. *N. Y. M. J.*, 1918, cviii, 287.

The author pictures the suffering from tuberculous laryngitis, the painful, fatal complication of pulmonary tuberculosis, and draws attention to the helplessness of the physician in the treatment of this complication.

In discussing the methods of prevention, the etiology is mentioned. Tuberculous laryngitis is secondary to pulmonary tuberculosis; the mode of

invasion is through the sputum, the tubercle bacillus being the direct etiological factor; the bacilli gain access only through a membrane that has had its resistance lowered; the chief factors that lower the resistance are to be found in the nose, epipharynx, and pharynx.

With these data, the first step toward prevention lies in discovering and correcting any condition interfering with normal respiration, or any condition acting as an irritant.

Of these specific conditions are mentioned the following: (1) deflected septum, or a spur; (2) sinus disease; (3) hypertrophied turbinates; (4) diseased tonsils and adenoids; (5) pharyngitis; (6) lingual tonsil; (7) elongated uvula.

Some of these conditions act by producing cough, which in turn irritates and congests the larynx.

OTTO M. ROTT.

Hastings, H.: Removal of Foreign Bodies from the Larynx, Disproving Previously Made Diagnosis. *Ann. Otol., Rhinol. & Laryngol.*, 1918, xxvii, 176.

The author reports two cases in which foreign bodies were removed from the larynx, although the conditions were mistaken for respiratory diseases such as croup and thymic asthma. He draws attention to the importance of keeping in mind the possibility of a foreign body in the larynx in all such cases, and the aid of direct laryngoscopy in clearing up the diagnosis, as well as in removing the foreign body. OTTO M. ROTT.

Schiller, A. N.: Retropharyngeal Abscess in Infants. *Med. Rec.*, 1918, xciv, 457.

There exists in infants a chain of lymph-glands that are located on the lateral wall of the pharynx. The function of these glands is to drain the base of the skull and the nasal pharynx. At the age of fifteen months these glands begin to atrophy, and disappear at about three years. The cervical and submaxillary glands then assume the function of draining the areas mentioned above. The retropharyngeal abscess of infants is an inflammation of these nodes which goes on to suppuration.

Holt states that 75 per cent of the cases occur in the first year. Bokai reported 62 cases, 42 occurring in the first year. Snow reported 114 cases, 86 per cent in the first year.

Occasionally there are no symptoms, spontaneous rupture, asphyxia, and death occurring without warning. The first symptom noticed by the parents is usually difficulty in swallowing or breathing. The first sign, and the one that every case presents, is a submaxillary adenitis; the adenitis is unilateral and on the side of the abscess. On examining the neck there is evident puffiness, but no redness of the skin. Palpation shows the swelling to be soft, the glands small and distinct and never matted together. The amount of swelling is out of proportion to the size of the glands, and is due to the infiltration of serum in the periglandular tissues.

In making a diagnosis, one should always look for the adenitis and examine carefully the pharynx by means of the finger.

If the disease is unrecognized, death from asphyxia may follow. With prompt diagnosis and surgical interference the mortality is low. Treatment is surgical, and consists in evacuating the abscess. J. A. WINTER.

MOUTH

Federspiel, M. N.: Surgical Correction of a Double Harelip, Alveolar Cleft, and Cleft of Hard and Soft Palate. *Dental Cosmos*, 1918, lx, 581.

Federspiel reports a case of a child of four years with a double harelip, double alveolar cleft, and a cleft of the hard and soft palate. Examination before operation showed a very marked protruding premaxillary bone holding two central incisors. The clefts of the alveolar process united with a medium-sized cleft of the hard and soft palate. Further examination at the time of operation showed that the protruding mass contained two central incisors, which were tipped lingually. The lateral halves of the upper jaw were very well developed and held two well developed deciduous teeth, the occlusion of these being in normal mesiodistal relation.

The shifting of the protruding mass distally would not permit the closing of the alveolar cleft, for the mass in itself was too narrow to complete the normal upper arch. Therefore the protruding mass was removed and the vomer bone was prepared to act as a good base for the artificial restoration of two central incisors. The technique employed was as follows:

The mucoperiosteal flap on the labial and lingual surfaces was dissected, and the mass, containing the two deciduous centrals and the tooth buds of the permanent centrals, was removed. The flaps of soft tissue were then brought in contact and stitched on the lateral halves of the jawbone so as to close the anterior portion of the floor of the nose.

Following this operation, the double cleft of the lip was closed by bringing in contact the soft tissues which covered the protruding mass and the borders of the lip on each side. The vermilion surfaces were carefully joined, and the alæ of the nose were turned inward so as to give the boy the proper-shaped nostrils. Paraffin silk was used to suture the soft tissues. The wound was kept clean by gently washing it with boric acid solution. The stitches were remosved on the eighth day following and the patient was then able to functionate his lip normally.

The cleft of hard and soft palates is to be closed in about six months. In order to keep the space open between the lateral incisors, an orthodontic retaining wire will be fitted and adjusted so as to insure this space, which at a later date can be restored with a well-fitted anchor denture holding two central incisors. G. W. HOCHREIN.

Cole, P. P.: Ununited Fractures of the Mandible; Their Incidence, Causation, and Treatment. *Brit. J. Surg.*, 1918, vi, 57.

From Cole's experience in general military as well as in jaw surgery, he has concluded that non-union occurs more frequently in the lower jaw than in any bone of the extremities. The reason for this higher incidence is determined by several factors: a corresponding degree of destruction in the case of the extremities would frequently lead to amputation; approximation with such loss of tissue as would give a good result in the case of a limb would result in the jaw in such deformity and hopeless loss of function as to render this procedure impracticable; the superficial areas of the fractured surfaces are, particularly in some situations, small as compared with that of the humerus, femur, or tibia.

There are numerous methods of treatment advocated in the case of fractures of the mandible. Two schools exist whose views on the subject are widely divergent. The one maintains that bony union is of paramount importance; that correct alignment is incompatible with union in cases associated with loss of substance; and that therefore deformity of varying degree must not only be tolerated, but deliberately produced in order that bony union may be obtained. The other school also believes in the importance of bony union, but it holds that correct alignment should be determined in every case.

The fundamental principle that shapes the procedure of what may be termed the ideal school is the restoration of the normal arch and maintenance of accurate occlusion.

Non-union is due to four factors: (1) primary loss of substance; (2) secondary loss of substance, due to necrosis; (3) interposition of muscle, fascia, or other connective tissue; (4) presence of a central sequestrum. This is a rare cause of non-union.

In repair of fractures it is to be assumed that in the ordinary healthy individual bone possesses sufficient regenerative power to make good any defect caused by injury, provided that the conditions are such as to give the best possible effect to the factors which favor the process of regeneration. These factors are: first, the prevention of interposition; second, restoration or preservation of that stress which is the normal stimulus to the growth of bone.

The attainment of union is undoubtedly important in so far as it fulfills a functional demand.

There is, however, no academic virtue in union apart from this, and therefore the ultimate and only test should be a functional one: in the case of the mandible the patient's ability to masticate ordinary foods. This functional estimate is of importance from the point of view of treatment. It will be the deciding factor in determining the advisability of endeavoring by open operation to make good the functional defect. The extent of the functional defect and the improvement likely to follow operation should be duly considered.

In the treatment of non-union the author has employed various methods, such as plating, wiring, and bone-grafting. In two cases plating was used, in one a simple plating with a two-holed silver plate. Only partial success is claimed for this case. In the second case a four-holed silver plate was used, the gap being strewn with bone fragments detached from the angle of the jaw. The plate was later removed in the hope that further consolidation might occur. This case was a complete failure. Functionally, his occlusion is perfect, but the grinding movement is considerably impaired.

In one case he used wiring without a plate and the functional result was perfect. Ten cases were operated upon by the use of free bone grafts. The technique employed was as follows: Two or three days previous to operation, upper and lower cast-metal cap-splints are cemented in place. These splints are provided with bilateral overlapping threaded flanges which, when fixed together by screws, determine the position of the fragments in correct alignment. When the patient is on the operating table, these screws are removed, allowing the mouth to be freely opened for the passage of the intratracheal catheter. As soon as the catheter is passed, the screws are replaced.

A curved skin incision extending well into the neck is now made and a flap turned up to expose the site of fracture. Bleeding vessels are ligated and towels clipped to the skin margins. The ends of the fragments are then exposed, freshened, and shaped for the reception of the graft. The graft is taken from the tibia and cut to the shape desired. Plates are screwed to the graft before the detaching cross-cuts are made. The graft with the detached plates is then transferred to its destined site and fixed in the gap by two screws attaching each plate to the corresponding fragment of the fractured mandible, and the wound sewed up.

In two cases thus operated upon suppuration occured with extrusion of the whole graft. Three cases were entirely successful. In the remaining five cases, progress has been such that at the very minimum a percentage success of 60 is assured.

He has also used pedicled grafts in eight cases. The results obtained by this method are rapid and certain. To such an extent is this so, that in cases with non-union amenable to treatment by means of a pedicled graft, success can be practically guaranteed.

The results obtained in the treatment of ununited fractures of the mandible are such as to justify the conclusion that no patient so afflicted should be discharged until operation has not only been offered to but urged upon him. The functional disability associated with ununited fracture of the mandible is an unnecessary disability in most cases. It is a blot upon the escutcheon of surgery which should be removed. G. W. HOCHREIN.

Morestin, H.: Closure of the Palatal Breach After Resection of the Superior Maxillary (L'occlusion de la brêche palatine après la résection du maxillaire supérieure). *Bull. et mém. Soc. de chir. de Par.*, 1918, xliv, 1002.

The breach left after an extensive resection of the upper maxilla, especially for malignant tumors, tends toward spontaneous closure; nevertheless there is persistence of communication between the mouth and the nasal fossæ which no prosthetic appliance can satisfactorily remedy. Mere external deformities can be remedied by cartilage grafts as previously reported by Morestin, but the case is quite different when there is an extensive palatal breach. In this latter case Morestin thinks that the mucous membrane of the chin, just below the lip, offers remarkable resources to the surgeon in reparative surgery in the palatal region.

When the plastic operation can be carried out immediately, the results are very much better than when it is done long after the maxillary resection. The breach often measures 3 to 5 cm. deep and 2 to 4 cm. wide; and in a loss of substance of this extent there is no other way than to use the mucous membrane of the cheek. But in the minor losses the author uses strips cut from the upper portion of the chin. The procedure is divided into four stages: (1) freshening up the edges of the breach; (2) dissection and mobilization of the chin mucous membrane; (3) stripping the palatal fibromucous tissue; (4) suture.

The freshening is done so that half the thickness of the fibromucous edge is cut away leaving a collarette all around with its freshened face toward the mouth. The pediculated flaps from the chin are passed inward through incisions made in the cheek in the vicinity of the edge of the breach. All fibrous tissue about the edge of the breach must be fully removed before the mucous membrane from the chin is fitted and sutured in position to the palatal mucous.

A small curved Reverdin needle and silkworm gut are used in suturing. The operation is done under local anæsthesia. Although abundant hæmorrhage is usual in cutting the chin tissues, it does not persist and easily yields to tampons. The closure of the entire breach may be satisfactory after the first attempt, or it may require a number of similar operations before it is finally accomplished.

Morestin describes in full detail four cases in which he satisfactorily carried out this autoplastic operation. In these cases the maxillary resection was prior to the plastic operation. But in very many cases, Morestin thinks that there is no use in waiting but that the breach should be closed at the time of its creation. In these cases the mucous membrane of the cheek can generally be used. The closure of the breach does not prevent the application of prosthetic apparatus. W. A. Brennan.

Freer, O. T.: A Carcinoma of the Epiglottis and Root of the Tongue Removed by the Simpson Radium Needles, with Description of a Needle-Placing Instrument. *Tr. Am. Laryngol. Ass.*, Atlantic City, 1918, May.

The Simpson needles are short hollow needles one and one-sixteenth of an inch long and one-sixteenth of an inch thick, made of steel and platinum plated with gold, the cavity of the needle being packed with 12 millimeters of radium sulphate, which is sealed within the needle after the detachable eye portion of the needle has been screwed down upon its hollow shank. The wall of the hollow needle is three-tenths of a millimeter thick, thick enough to filter out the irritating α and softer β rays, while permitting the hard β and γ rays to pass freely through the wall of the needle.

The needles are stout enough to endure the firm grasp of a needle-holder for their introduction into the tissues, but Freer has devised a needle-placer for inserting the needles, a device which, in the case of carcinoma of the laryngopharynx just treated, has permitted their exact introduction into the flesh with an accuracy and ease that he thinks will make it possible to needle even intrinsic carcinoma of the larynx by the indirect mirror method of laryngoscopy, a method so much less distressing to the patient than direct or suspension laryngoscopy.

With several Simpson needles the effective so-called cross-firing of radium rays may be produced, and a single completely effective large dose of radium rays is obtained by leaving the Simpson needles in place for from nine to twelve hours. Their efficient screening prevents the undesirable integumentary burns that were so common before it became known that the soft β rays and the α rays must be filtered out. Otto M. Rott.

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